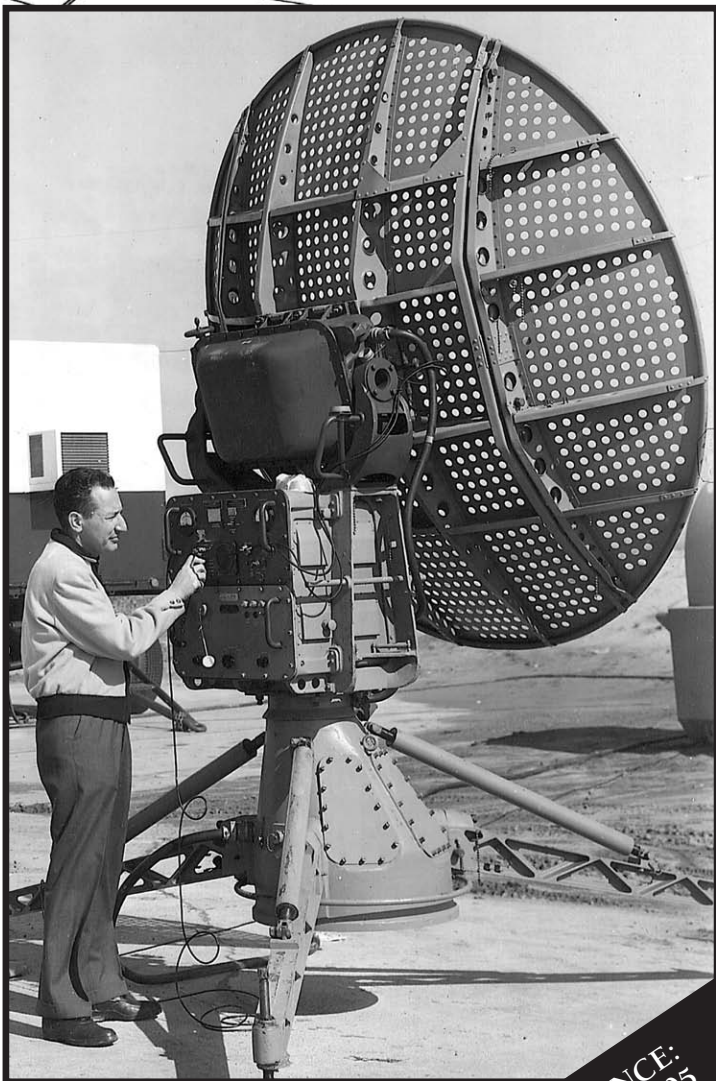


The AWA Journal

Quarterly Bulletin of the Antique Wireless Association, Inc.®

July 2005, Vol. 46 / #3



1680 MHz automatic tracking radiosonde receiving station (see p.00).



Published for the radio collector,
historian, restorer and all
vintage communications
enthusiasts.

AWA CONFERENCE:
AUGUST 23-27, 2005
THEME: WESTERN ELECTRIC
SEE SPECIAL INSERT INSIDE

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THE PRESIDENT'S MESSAGE

Greetings,

The planning for the 2005 AWA conference is well under way and it should be a great one! We will have a wonderful mix of seminars and other functions, so make plans to be there in August. You will find all of the details in this issue of the *Journal*.



Many thanks go to all of the volunteers who make this event possible. If you would like to help at the conference or get more involved just let me know.

We are always looking for ideas and input.

There have been quite a few radio meets this year already. We started off with the Spring Meet in the Carolinas, Hosted by the Carolinas Chapter of AWA. Ron Lawrence and crew do a great job in putting this meet on. If you are in that area of the country in late March, plan on being there. You will not be disappointed.

The AWA had its spring meet in Bloomfield, NY on May 7th. It seems to be getting larger every year. The meet is now held at the Elementary School around the corner from the Annex. Thanks to all of the volunteers at the museum and Annex for hosting this event. My hat goes off to Ed Gable, our Curator/Museum Trustee and AWA board member. If you happen to see Ed, be sure to personally thank him and his vol-

unteers for all of their hard work. They are our unsung heroes.

I have some very important news for all members. The AWA now has a new Chapter in Georgia. The Southeastern Antique Radio Society has joined us. I welcome them to the family and hope we can work together to make this hobby even better. Their web site is: www.sarsradio.com.

Please visit there for all info. Many thanks to Bob Niven, Rich Rodgers and all of the members of SARS for their hard work in making this happen.

I hope to see many of you at an upcoming radio meet. My schedule includes the Mid-Atlantic Radio Club meet in early June in Beltsville, MD; The Michigan Antique Radio Club meet in early July in Lansing, MI; and The Antique Radio Club of Illinois meet in early August in their new location, Bolingbrook, IL. Apart from that, you can always find me at my home away from home: the Museum of Radio and Technology in Huntington, WV.

Well enough for now. As always I am always eager to hear from you.

If you have any questions or comments feel free to contact me, But please, no calls after 9:30 p.m. (eastern time), if possible.

Geoffrey Bourne

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LETTERS TO THE EDITOR

All letters to the Editor are read with interest and attention, though not all can be published in this column. Letters may be paraphrased, shortened or otherwise edited to fit the available space. The statements made by our correspondents are their own opinions and do not necessarily reflect the views of either the AWA Journal staff or the Antique Wireless Association.

KELLEY HF NET MEETING

The annual lunch meeting of the Bruce Kelley HF Net was held at Peddler's Village, Lahaska,



The HF net gang: Front row: Doug, WA3DSP; Paul, W3VVS; Don, WB2ETC and XYL; John, K3BLC; Eunice, XYL of W3VVS; Tom, WA3KLR. Back Row: Roy, WA3TWS; Paul, K3KRE; Bill, W2DGB and XYL Marge; Dave, W3WBE; Floyd, W3OLV.

PA on May 12, 2005. It was a bright sunny day and we met in the parking lot where the latest homebrew projects and rig restorations were shown. Al, W2OBJ, net control operator, was unable to attend. We are also very sorry to report the passing of Al's wife, Estelle, in late May.

DOUG CROMPTON, WA3DSP

Via e-mail

NFWA MEET COMING!

The Niagara Frontier Wireless Association Meet is almost upon us (Saturday, August 6), so I thought I'd provide a little background for those who have never attended. The Meet is held at the Amherst Museum north of Buffalo, NY. The modest admission fee also covers admission to the Museum, which—in addition to its many other in-

FROM THE EDITOR

Meet the Editors

I'm really looking forward to attending this year's Conference, especially since it will give me the opportunity to meet and chat with so many of you! This year, we've scheduled a special opportunity for previous authors and, in fact, all members, to get together with the editors. Check the conference schedule in this issue under Thursday (8-25) at 2 pm. I'll be there along with Brian Belanger, Editor of *The AWA Review*. There also be several *Journal* Column Editors in attendance. We'll welcome any suggestions you might have about our publications as well as ideas for future *Review* or *Journal* articles.

Classified Scam Artists

You may have noticed that our classified column has been shrinking little by little, issue after

issue. The reason obviously is that the Internet offers many additional opportunities for people to list their wants and needs. If the shrinkage continues, we'll eventually lose this very interesting and useful feature of the *Journal*.

In an attempt to boost participation in the column, we've been posting the classifieds on our web site for all to read. And we've recently begun to allow members and non-members alike to post classifieds free of charge.

But this wider circulation has a downside. Members who have items to sell have reported being exposed to scam offers. Larry Babcock was one of the first to report this in a letter that appeared in our last issue. And a warning based on Larry's letter is now a permanent part of our Classified column heading. Read it carefully before you respond to any offers!—mfe

FROM THE CONFERENCE CHAIRMAN

It seems only a few weeks since I left for home after the last conference, yet here we are with the 2005 conference around the corner. This year we continue to provide speakers covering almost all aspects of early (and not so early) wireless and related technologies. Of course we will have the flea market, book fair, old equipment contest and other events, such as the Friday Night Banquet. If you haven't seen the museum in some time, be sure to sign up for the bus leaving Wednesday at 6:30 p.m.

Our shuttle bus service to local hotels, which was only sparsely used in previous years, has been discontinued. Instead we've arranged for conference attendees staying at other hotels to have parking privileges (on a first come, first served basis) in the RIT lot. But be careful! Parking outside of the formally marked spots is a prohibited by local fire law. This is strictly enforced and violators are likely to be towed at their own expense. Parking is also prohibited on the roads adjacent to the RIT Conference Center.—hd

The Amherst Museum display includes this 13-tube WurliTzer carved console manufactured in N. Tonawanda, NY.



teresting exhibits, has one room devoted to a permanent collection of antique radios. There is no seller's fee or any other surcharge. Coffee and donuts are free.

Though the setting is park-like and the atmosphere is relaxed, a lot of serious buying and selling takes place. Last year, about 150 collectors attended—this in spite of the fact that a local ham organization was holding a meet nearby on the same day. The many Canadians who attend give the event an international flavor and bring some unusual items to the flea market.

Sales were brisk at the four tables my wife and I had set up. I also sold a couple of radios at the auction at very satisfactory prices. The auc-

tion went on for a full 1½ hours, with buyers sitting on park benches on the tree-shaded lawn.

So come out and join us in August! You'll find directions and other details in the AWA News column under "Calendar of Meets."

LARRY BABCOCK
East Amherst, NY

A WORD TO THE WISE....

I like to think that I live in an above-average neighborhood where crime is the least of our worries. But not long ago, in readying our home for sale so that we could move to a low-maintenance one, many strangers passed through. We used the services of a cleaning crew, painters and

(continued on page 10)

AWA NEWS



AWA JOURNAL POLICY ON PROMOTING EVENTS: The *AWA Journal* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Do not send your information directly to the *Journal* Editor. Please send it to Pat Muehlbauer, P.O. Box 108, Stafford, NY 14143. Closing date is six weeks prior to first day of month of issue.

Calendar of AWA Activities

CCAFA Events Summary (See Calendar of Meets)

August 4-6

ARCI/AWA 25th Anniversary Radiofest

November 13

AWA, Inc. Membership and Board Meeting

August 6

NFWA/AWA Meet

November 13

AWA Museum Membership and Board Meeting

August 23-27

AWA Annual Conference

Calendar of Meets

(AWA logo identifies AWA-sponsored events)

ARCI/AWA 25TH ANNIVERSARY RADIOFEST

August 4-6



This year, for ARCI's 25th anniversary, the club is featuring a wonderful banquet including "swinging" musical entertainment (reservation required—only \$19.50). The general public may attend Radiofest as our guests; there is no admission fee and non-members may shop at the swap-meet as well as attend all outdoor events. Sellers must be members. (\$15 per year).

Scouts in uniform will be admitted to all events and may apply for merit badge certification in "radio" and/or "collecting." Vintage radio station W9R will be in operation as a special featured event. There will be a SILVER anniversary old equipment contest (\$100, Dr. Ralph Muehlbauer, top prize), display radios, ladies' luncheon, auctions, raffles, show-and-tell, hospitality booth (free drinks and snacks) and appraisal booth.

Bruce DuMont, founder and president of the Museum of Broadcast Communications will give a presentation regarding the museum's re-opening. There will be programs on plastic radios by Kris Gimmy, rare microphones by Bob Paquette, Farnsworth TV by Dr. Steve Hofer, and Atwater Kent by Jeff Aulik and Mike Kreuser.

NEW LOCATION: Bolingbrook Holiday Inn, 205 Remington Blvd., Bolingbrook, Illinois 60440 (630) 679-1600. INFORMATION: ARCI,

P.O. Box 1139, LaGrange Park, Illinois 60526 (630) 739-1060. www.antique-radios.org

NIAGARA FRONTIER WIRELESS ASSOCIATION

August 6



Annual joint meet with the AWA. At the Amherst Museum, Amherst, NY (north of Buffalo). From the NY State Thruway, take Exit 49 (Transit Rd., Rt. 78) north nine miles. Left on Tonawanda Creek Rd. just before entering Niagara County (there is also a Tonawanda Creek Rd. in Niagara County on the north side of the Creek). Proceed two miles west to the Museum. The meet is outside just west of the buildings. There are lots of motels and restaurants at Thruway Exit 49. Flea market opens at 8 a.m.; auction begins at 11:00 and there will also be a donation auction. The Museum exhibits open at 11:30. Contest categories will be broad enough to include any item related to early radio. The \$5.00 entry fee includes annual NFWA membership, museum admission, flea-market setup. No additional fees to sell or for any other activity. Free coffee and donuts. Lunch available. For info, call Larry Babcock at (716) 741-3082 or President Gary Parzy at (716) 668-2943.

AWA ANNUAL CONFERENCE

August 23-27



At Rochester Institute of Technology Conference Center (formerly Thruway Marriott). I-90 Exit 46 to I-390 North to NY 253 West to NY 15 South. RIT Info Number (585) 359-1800. **Also see Conference section in this issue.**

AWA, INC MEMBERSHIP AND BOARD MEETING

November 13



AT RIT Conference Center (see above). Membership meeting at 11 a.m. All members welcome. Board meeting follows.

AWA MUSEUM MEMBERSHIP AND BOARD MEETING

November 13



Same location as above. Membership meeting (all members welcome), followed by board meeting, begins at conclusion of AWA, Inc. board meeting.

Recurring Meetings & Events

- Antique Radio Collectors of Ohio—meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: \$10.00 per year. For more info, contact Karl Koogler: mail to above address; phone (937) 294-8960; e-mail karlkrad@gemair.com.

- California Historical Radio Society—For info on current meetings, call the CHRS hotline: (415) 821-9800.

- CARS, the Cincinnati Antique Radio Society—Meets on the third Wednesday of each month at The United Methodist Church, 7388 E. Kemper Rd. For more information contact Tina Hauke at (513) 247-9406.

- Carolinas Chapter of the AWA—Hosts four “mini-swap-meets” each year (in January, May, July and October) plus an annual conference, “Spring Meet in the Carolinas,” on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the web site at CC-AWA.ORG or contact Ron Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@carolina.rr.com

- Central Ohio Antique Radio Assn.—Meets at 7:30 p.m., third Wednesday of each month at Devry Institute of Technology, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B). Contact: Barry Gould (614) 777-8534.

- Delaware Valley Historic Radio Club—Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: \$15.00, which includes a subscription to the club’s monthly newsletter *The Oscillator*. For more info contact Delaware Valley Historic Radio Club, P.O. Box 5053, New Britain, PA 18901. Phone (215) 345-4248.

- The Downer’s Grove (IL) Park District Museum sponsors a monthly “Collector’s Hour.” Participants have the opportunity to display collections at the facility for several weeks before making their individual presentations. The event is open to the public with no admission charge. The museum has also begun to sponsor a yearly “Collector’s Fair.” For more info, contact Mark Harmon, The Downer’s Grove Park District Museum, 831 Maple Ave., Downer’s Grove, IL, 630-963-1309, fax 630-963-0496, mharmon@xnet.com.

- Houston Vintage Radio Association (HVRA)—Meets monthly on the second Tuesday (April thru Oct) at Bayland Park, 6:30-9

AWA LIFE MEMBERSHIPS ARE NOW AVAILABLE



Cost: \$400 (U.S.), \$500 (elsewhere). Send your check to Antique Wireless Association, P.O. Box 108, Stafford, NY 14143; (585) 343-6436; e-mail antiquewireless@yahoo.com.

p.m. in SW Houston. March and November meetings are held on Saturdays at the American Legion Hall off Alba Street in North Houston at 9 a.m. Each meeting includes an auction and program. Two one-day auctions are held each spring and fall. An annual convention is held in February. A newsletter, *The Grid Leak*, is published monthly. Membership is \$20/yr. Web site: www.HVRA.org. Write: HVRA, P.O. Box 31276, 77231-1276 or call Bill Werzner 713-721-2242 (e-mail: mingqi53@sbcglobal.net).

- Hudson Valley Antique Radio & Phono Society—Meets third Thursday of month, 7 p.m. meeting, swap meet, and membership info: Peter DeAngelo, President, HARPS, 25 Co. Rt. 51, Campbell Hall, NY 10916. (914) 496-5130.

- Indiana Historical Radio Society—Meets quarterly in Feb., May, Aug or Sept and Oct. Flea Market and Old Equipment Contest at all events. Auctions at all but Feb. meet. The *IHRB Bulletin* has been published quarterly for the

AWA NETS

(EASTERN TIME)

PHONE

SUNDAY:

7237 kHz, SSB, noon (NCS: VARIOUS);
3837 kHz, AM 4:30 p.m. (NCS: KA2J & W2AN)

TUESDAY:

14274 kHz, SSB, 2:30 p.m. (NCSs: KC3YE and W0FX)
3837 kHz SSB, 8 p.m. (NCS: WB2SYQ)

MONDAY-WEDNESDAY-FRIDAY:

The AWA Bruce Kelley HF Net
3867 kHz, SSB, 9:30 a.m. (NCS: W20BJ)

CW

DAILY, 4 p.m., 3588 or 7050 kHz. Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see what you stir up. First WEDNESDAY of each month, 8 p.m., 7050 kHz

2-M REPEATER (Rochester Area)

MONDAY, 7:30 p.m. (NCS: K2GBR)
Receive 145.290 MHz
Transmit 144.690 MHz

With the Chapters



March 24-26 marked another great Charlotte CC-AWA Conference at the Sheraton Charlotte Airport Hotel. The Charlotte show has been on the fourth weekend in March for many years now, but this was only the second time since the early 80s that Easter also fell on this weekend too. I'm sure that this was a major reason the overall attendance was down a bit, but those that did attend had a fine time as usual.



Bidding was spirited at the well-attended auctions.

Our well-attended Thursday afternoon programs included a Tube Collectors forum with guest host Ludwell Sibley; a tube tester forum by Lud and Kirk Cline; Robert Lozier's presentation of glass slides showing early RCA tube production; Jim Oram's interesting talk about German Enigma code machines and his effort to make reproduction parts for them. (Jim's parts are so exact they're used at the National Cryptologic Museum to keep their Enigmas running).

Thursday evening we ran the first part of an estate auction that was consigned to us by the family of Larry Boyer, a retired RCA engineer. Larry, who went to work at the RCA labs in Camden NJ just after WW2, had the foresight to collect early RCA artifacts before they could be destroyed. Along with a very nice collection of mostly 20s radios, the boxes and boxes that we found in Larry's attic comprised a time capsule of rare radio related paper and catalogs plus a lot of very rare tubes. The Thursday evening "Tube, Paper & Ephemera" auction lasted 4½ hours and netted over \$14,000 in sales.

Friday morning we kicked off of first flea market session with our now-traditional "LeMans Start." No buying, selling or trading is allowed before 8 a.m. and everyone has to be out of the flea market area prior to the start time.

The Friday afternoon auction included radios and other hardware. Included was a very rare Edi-

son Concert 5" cylinder phonograph with both playback and record heads, its original cover, and an Edison 5" wax cylinder. Several members of the phonograph collecting community attended to bid on this and several other vintage machines. Total sales for the Friday afternoon auction were just over \$30K for a total of over \$44K in sales for both.

The Friday evening banquet was followed by a viewing of the items entered in the Old Equipment



Well documented RME display was one of very interesting exhibits at the equipment contest.



Many treasures changed hands at the Friday/Saturday flea market.

Contest. Alfred H. Grebe Jr. was a special guest speaker at the banquet.

Saturday morning got started early with more flea market followed by our traditional end of meet "Radio Rescue" auction

which is always a good way to find that last minute bargain before heading home.

The Conference wrapped up with our Saturday luncheon and contest report.

I would like to thank all the folks that stepped up to help with making this event the success it continues to be. All the pre-planning is done by just a couple of people, but it takes many, many good friends to make the show happen. Thanks to, RL and Linda Barnett, Gerald Cromer, Ernie Hite and his son Everett Hite, Clare Owens, Tom Houghtaling, Ted Bryan, Ted Miller, Robert Lozier, AWA President Geoff Bourne, our auctioneer (who made it through three auctions) Brad Jones, Richard Wayne, Gary Carter and many others whose names I just can't think of right now.

Look for us again next year, 2006 on the fourth weekend in March.

Ron Lawrence KC4YOY, CC-AWA President
kc4yoy@carolina.rr.com
P.O. Box 3015
Matthews, NC 28106
704-289-1166

past 32 years. For meet details and information about the club and our Indiana Historic Radio Museum in Ligonier, IN see our Web site at www.indianahistoricalradio.org or contact Herman Gross, W9ITT, 1705 Gordon Dr., Kokomo, IN 46902-5977, (765) 459-8308, w9itt@mind-spring.com

- London Vintage Radio Club—This Ontario, Canada club meets in London on the first Saturday of January, March, May, June and November. Annual flea market held in Guelph, Ontario in September in conjunction with the Toronto club. Contact: Lloyd Swackhammer, VE3IIA, RR#2, Alma, Ontario, Canada N0B1A0. (519) 638-2827. E-mail contact is Nathan Luo at lvrcreditor@yahoo.com.

- Mid-Atlantic Radio Club—Meets monthly, usually the third Sunday of the month at the New Hope Seventh Day Adventist Church, Burtonsville, MD. Contacts: President, Geoff Shearer, 14408 Brookmere Dr., Centreville, VA 20120, e-mail gshearer@cox.net; Membership Chair, Paul Farmer, (540) 987-8759, e-mail: ol-dradiotime@hotmail.com. Website www.maarc.org.

- New Jersey Antique Radio Club—Meets second Friday each month, 7:30 p.m. Holds three annual swap meets. Contact (send SASE) Phil Vourtsis, 13 Cornell Pl., Manalapan, NJ 07726, (732) 446-2427.

- Northland Antique Radio Club—hosts four events with swap meets each year (in February, May, September and November) including an annual conference, "Radio Daze," for two days in mid-May. Annual dues are \$12.00, which includes a subscription to the club's quarterly newsletter. For more info, visit our web site at www.geocities.com/northland.geo/; contact Ed Ripley at (651) 457-0085; or write NARC, P.O. Box 18362, Minneapolis, MN 55418.

- Northwest Vintage Radio Society—Meets second Saturday of each month (except July and August), at or about 10 a.m., at Abemathy Grange Hall, 15745 S. Harley Ave., Oregon City, OR. Members display radios, exchange information. Guests welcome at all meetings and functions, except board meetings. For info, write the Society at

P.O. Box 82379, Portland, Oregon 97282-0379.

- Oklahoma Vintage Radio Collectors—Oklahoma City Chapter meets second Saturday each month at Hometown Buffet, 3900 N.W. 63rd St., Oklahoma City, OK. Visitors welcome. Dinner/socializing, 6 p.m.; meeting at 7 p.m. Membership, \$12/yr., includes monthly *Broadcast News*. Info: SASE to OKVRC, P.O. Box 50625, Midwest City, OK 73140-5625; or contact Fred Karner at (405) 769-4656 or fkarnet@cox.net; or visit our web site at <http://members.cox.net/~okvrc/>

- Ottawa Vintage Radio Club—Meets monthly (except June and July) in the Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario, Canada. Contact: Lea Barker at (613) 829-1804 or check www.ovrc.org. Membership: \$10 Canadian/yr.

- Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea market/contests in March, June, September, and December. An auction is included in September, and our annual luncheon/program is held the first Saturday in December. Our newsletter, *The Pittsburgh Oscillator*, is published quarterly. Web site: www.nb.net/~schaefer/pars.html For directions, specific dates, information call President Bonnie Novak at 412-481-1563 or write to Karl Laurin, 8111 Sally, White Oak, PA 15131.

- Society for Preservation of Antique Radio Knowledge—Meets at 7:30 p.m. the second and fourth Tuesdays of each month in the party room at Cassano's Pizza Parlor, 1700 East Stroop Rd., Kettering, OH. Membership, \$18/year. Write SPARK Inc, P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call John Pansing at (937) 299-9570.

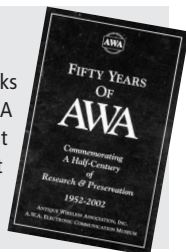
- Texas Antique Radio Club—Meets alternate months in Kyle and Shertz, TX. Contact: Ron Manning, President TARC, 133 East Huisache Ave., San Antonio, TX 78212. Phone (210) 734-6831; e-mail ronmeg@gateway.net; Web site www.gvtc.com/~edengel/TARC.htm.

Service Sources Available

The AWA Source Sheet is a listing of parts

50TH ANNIVERSARY COMMEMORATIVE BOOKLET

Our 50th anniversary commemorative booklet *Fifty Years of AWA* has received high marks from everyone who has seen it. We still have a stock of this profusely-illustrated 60-page AWA history available for those who would like extra copies or those who were not members at the time of distribution and didn't receive one. Cost is \$7.00 per copy postpaid, no limit. But once they're gone they're gone—so act now if you are interested! Send your check to Antique Wireless Association, P.O. Box 108, Stafford, NY 14143.



suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope to AWA, Box E, Breesport, NY 14816.

AWA VHS Video Programs

The Antique Wireless Association has available several historical documentaries to loan to

affiliated organizations for club meetings and programs. There is no charge for this service other than return mailing cost. For info on loan conditions, to make reservations, or just inquire, contact Ed Gable, Curator, AWA Electronic Communication Museum, 187 Lighthouse Rd., Hilton, NY 14468. See any previous *Journal* issue for listing of available programs.

THE AWA REVIEW, VOLUME 18 IS PROGRESSING NICELY!

Editor Brian Belanger reports that the *AWA Review*, Vol. 18, will once again continue the tradition of presenting important archival articles on radio history. We have found a new printer this year, and we expect to keep the cost very affordable. Vol. 18, which should be available at the August conference, will contain at least the following five articles;

■ "Motor Buzzer Transmitters: Spark Goes QRP" by Russ Kleinman, Karen Blisard, and A. J. Link. Around the time of WW I the U.S. Navy used these low power transmitters, about which very little has previously been written.

■ "20th Century Evolution of the Submarine Telegraph" by Ludwell Sibley. Bill Holly's article about underwater cables in Volume 17 thoroughly documented the early history of submarine cables. Here Ludwell Sibley adds more information about the technology that was used in the latter part of the history of submarine cables.

■ "Wireless Specialty Apparatus Nomenclature Gone Awry" by Eric Wenaas. Eric Wenaas has uncovered obscure WSA company records and correspondence which, among other things, show that antique radio collectors for years have been wrong about WSA equipment designations. For example, the famous WSA Model IP-76 is actually 1P-76.

■ "Radio Advertisement and Fashion," by Barbara Havranek. Barbara Havranek's article features many great old radio ads, and explains the strategy of the ad designers who figured out how to sell more radios by designing ads that would catch people's attention.

■ "Made in Rochester," by Allan Pellnat. The AWA Museum has lots of radios and radio components made in Rochester, New York, because of the museum's proximity to that city. Allan Pellnat has researched the many Rochester-based radio firms and found some very obscure ones that you probably have not heard of before.

LETTERS TO THE EDITOR, continued from page 5

carpet cleaners. We also had an "open house" day, during which thirty or forty persons came through.

Six days later, on Saturday morning, I went downstairs to our recreation/antique radio display room and noticed something missing. Actually, it took about five seconds for me to realize that sixteen of my most cherished table-top radios were gone! I have collected about forty radios of one sort or another but the missing ones were my show-offs, my best ones; the rest were in storage. When the police asked for descriptions, serial numbers and value of the stolen property, I knew this was going from bad to worse.

When I began my collection I listed each acquisition by manufacturer and model number. but didn't include serial or chassis numbers or value. This was dumb. When friends and relations began giving me antique radios, I stopped keeping records entirely. This was dumber. I also did not have the special coverage required by the insurance company. This was the most dumb.

So, profit by my mistakes. Make sure that everything in your collection is listed, photographed, insured, priced, and perhaps marked with an inside identification sign. Since inflation

affects the replacement and actual value of your collection, even fairly current price-guide prices may be significantly low. An experienced estate appraiser can help you here, and his figures would also establish value for inheritance or museum donation purposes.

PAUL BERNAZANI
Vienna, VA

DOUBLER REBUTTAL

I just received the April *Journal*, and in looking over my article "A Simple MOPA Adapter for the 1929 QSO Party," I noticed that copy editor Joe Schroeder had added the comment "Doubling in the final provides lots of harmonics."

However, I had already checked spurious signal levels, including harmonics, from this set and found them to be well over 60 db down from the desired wave. Of course, careless tuning, such as dipping the PA stage to the second dip from maximum capacitance, will most certainly produce 3rd harmonic output and possibly 4th and some 5th harmonics as well, as the tank "Q" would be greatly reduced. Maybe an additional warning or
(continued on page 12)

MUSEUM NEWS

Visit us on the Internet at <http://www.antiquewireless.org>

OFFICERS

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Deputy Director

Allan Pellnat, KX2H

Secretary

Edward M Gable, KZMP
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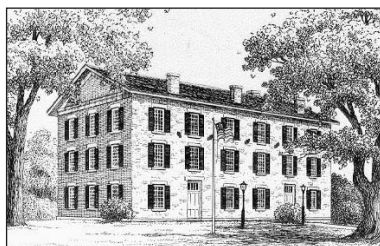
Thomas Peterson, Jr.*

Ronald Roach, W2FUI

Ronald Walker, WA2TT

Morgan Wesson

Roy Wildermuth, W3RLW



MUSEUM CONTACT

For all inquiries about the Museum and its operation, contact Edward M. Gable, Curator, 187 Lighthouse Rd., Hilton, NY 14468. Phone: (585) 392-3088, e-mail: egable@rochester.rr.com.
The AWA. Electronic Communication Museum is an IRS 501(c)3 charitable organization.

*also on AWA Inc. Board of Directors

Greetings from your Museum crew. A great time was had by all at the AWA Museum Spring Meet on May 7th. The weather was great at the start of the day but turned to rain by mid-morning. This did nothing more than justify last year's decision to move the Meet to an all indoor location. Meet Coordinator Ron Roach, W2FUI, and his volunteers from the museum staff did a wonderful job of planning and execution.

The talks by Nori Irwin, Curator of the Hammond Museum of Radio in Guelph, Ontario, and by our own Museum Director, Thomas Peterson, Jr., were well attended and very entertaining, especially when Tom made big impressive sparks on his electrostatic machine.

The vendors were back, the indoor flea market was brisk and the auction, with Colonel Gable back by popular demand, broke all records for attendance and dollars brought in for the museum fund. The afternoon brought openings of both the Annex and the museum where visitors saw new exhibits including the display of the first products marketed by RCA and built by GE and Westinghouse.

Another new exhibit, for the "modern minded" visitor, was the cell phone display including our own first cell phone, the Bell/OKI Electronics s/n 00001 set. There was also a nice display showing the evolution of electronic phones donated by Walter and Jill Engelbrecht. This donation included cell phones from the suitcase and bag phone era all the way up to modern voice and data sets.

Following the morning sessions were meetings of the AWA Board of Directors and the Museum Trustees.

While on the topic of events, the just-com-

pleted AWA AM QSO Party was a real "happening." I don't remember hearing so much AM activity since my pre-SSB days during the 50s. There were some great stations on with huge signals as well as more diminutive signals emanating from DX-40s and Globe Scouts.

Several stations said that they were on AM for the first time. Hearing all the activity, they pressed the "AM" button on their rice boxes and joined in.

All participants owe a debt of gratitude to the team of Marc Ellis, N9EWJ, your *Journal* Editor, and Randy Haus, KB2PLW, for their efforts in developing this contest over the past few years. They experimented with various combinations of dates, times and operating modes to get the winning formula.

The Millen transmitter at the AWA Museum wireless station, 2AN, was in good voice. Several contacts were made with other museums during the contest.

In the "I just had to have it" category, I recently used some of my Trustee pre-approved acquisition fund to acquire an interesting radio set from an outfit in Canada calling themselves Redstarradio. It is a 1950s era Red Chinese military field set, HF, used in Korea and later missions.

The equipment arrived, exactly as advertised, packaged in boxes that had been submerged in wax to form a tight and effective seal. It was a real hoot for your museum crew as they opened each one, unable to read the Chinese symbols to ascertain the content before hand.

After unpacking, we found we had a transmitter, receiver, hand cranked generator, key and mic, antenna, tool box, spare tubes, VOM and a

manual written in Chinese. However, Redstar-radio had also thoughtfully included a rough but serviceable translation of the manual.

The receiver worked right away on AM but had a terrible warble on CW. It had to be opened (beautiful construction) for inspection and it was found that the fifty-plus-year-old grease on the variable cap had turned to crud and the rotor contacts needed cleaning and de-oxidizing. After that, the set worked fine. You'll see it various AWA displays.

I'm delighted to introduce two new museum volunteers; Lynn Bisha, W2BSN, and Gib Buckbee, KC2JTU. In joining us, Lynn found that he was carrying on a family tradition. While selecting the best sets to be used for our new RCA display he found several with a very familiar call-sign on the donor data card. They had been donated by Lynn's father thirty years before. Happy memories, Lynn, and welcome!

Many of you know Mike Csontos, one of the more senior volunteers at the museum. He has been busy gathering, from all sorts of places, his-

toric sound bites, video clips and industry-generated movies on various subjects related to the Museum's theme of electronic communication. These are being converted to DVD for storage and temporary archiving until a suitable long term storage media comes along.

Other news is that the AWA Museum recently signed a five- year lease for the current museum site at the East Bloomfield Historical building. In the past we had renewed in ten-year increments, but elected this shorter period in case other opportunities turned up. Be sure to visit the museum store ordering page elsewhere in this issue. If you haven't yet, also be sure to order your Conference tickets now, yes, today! See you in August. And mark your calendars now for next year's AWA Museum Spring Meet, May 6, 2006.

S'long for now...

Ed Gable

Ed Gable k2mp/w2an
Museum Curator

RECENT MUSEUM DONORS

- ❖ John Ward KE2STSix RCA 100A speakers
- ❖ Ivan Ville.....HQ-180A/C with S-200 Spkr, Ray-Jeff 6140 Direction Finder
- ❖ Beatrice Jones.....Multi-Elmac AF-68, tube tester, more...
- ❖ George Muller WA2IEOB&K TV Analyst
- ❖ Lynn Bisha W2BSNRME 6901, Coolidge X-ray tube Book
- ❖ Irene PtakSams Photofax, table radios
- ❖ Bob Hughner KA2YTUAudio frequency equalizer
- ❖ Ramsey Electronics.....Cushman and IFR FM communications analyzers
- ❖ Roy Wildermuth W3RLWCollins R-388/URR receiver
- ❖ Ray Grammer.....Large collection test equipment, tubes
- ❖ Tony Prasil.....Impedance Bridges, Books, more..
- ❖ Walter and Jill Engelbrech.....Large Collection (80+) cell phones
- ❖ Jim Shipkowski W2WWVThree Large Lab power supplies
- ❖ Monica KeadyWebster-Chicago 80A wire recorder
- ❖ Nan Sillman7 Inch Philco 50-701 TV plus magnifier lens
- ❖ Fr. Peter Deckman.....Complete Collins S-line with Linear
- ❖ Harris Corporation.....Generous cash gift
- ❖ Alfred Balik.....Cash Donation

LETTERS TO THE EDITOR, *continued from page 10*

explanation should have been included.

It's worth mentioning that the Heathkit DX20, Knight T-60 with 6AG7 and 807 final, Globe Chiefs of various models with a 6AG7 driving a pair of 807s, all doubled in the final stages to get to 10 meters.

A good friend of mine who has been a consulting broadcast engineer for many years has a

40-meter rig, with a T9X note, that doubles in the final. He says: "I would debate whether a properly biased (correct conduction angle) doubler is any worse than a straight-through class C amp with unknown number of degrees of conduction."

BOB RAIDE
Via e-mail



About Our Authors

LEON HILLMAN, W2JXJ

World War II Radiosonde Systems

Leon is a Registered (NJ) Professional Engineer with a career spanning over a half-century. He has been licensed as W2JXJ since 1936. He holds a degree in Electrical Engineering from NYU (evening division) and pursued advanced studies following service in the U.S. Army Air Force during WWII. He has been a Section Head at the U.S. Army Signal Engineering Lab at Ft. Monmouth, NJ, a Research Associate in the EE Department at NYU, and Chief Engineer of Production Research Corp.

In 1957 Leon organized his own company, Automation Dynamics. The firm developed antenna designs for aircraft and built instrumentation systems for atmospheric research. Later the company conducted test equipment projects for the U.S. space programs that sent the first men into space and to the moon. His biography appears in *Who's Who in America* and *Who's Who in Science and Engineering*.



STAN HOJNACKI, WA2NPL

Getting on 40 Meters—1929 Style

Stan was first licensed at 15 as a Novice, attained a General 8 months later and then took 18 years to get around to Extra. He's presently an Engineering Technician for the Lockheed-Martin Corporation. His career began at RCA (Camden, NJ) in 1980. At that time RCA was a fully self-sufficient manufacturing company and Stan was involved in every stage of product development from post engineering to final shipping. His interest in vintage radio began with his first look at a Fair Radio Sales catalog. He has been a member of the AWA since 1981.



DAVID W. KRAEUTER

Lessons From Laten: Diagnosis Without Test Gear

David Kraeuter was born in Homestead, PA in 1941. He holds an M.L.S. degree from the University of Pittsburgh. He has edited *The Pittsburgh Oscillator* and the monograph series of the Pittsburgh Antique Radio Society. Since the 1980s he has been interested in making the wealth of information buried in national patent publications more accessible to the public. In his book *Radio Patent Lists and Index, 1830-1980* published by the Edwin Mellen Press, he tabulates and indexes 6,200 U.S. and British patents

issued to 100 radio and television inventors.



KEITH A. KUNDE, K8KK

About That Second Diode...

Keith has been an electronics enthusiast for nearly 50 years. Though self-taught, his electronics interest has earned him jobs with companies such as Sterling Manufacturing (Truetone radios), Union Carbide (development lab), IBM Corporation (25 year career as mainframe networking Systems Engineer), Keithley Instruments (calibration and test), and ITT/ Educational Services (electronics instructor). Now retired but with limited time to pursue his electronics avocation, his goal is to write occasional articles on a variety of electronics subjects.



ROBERT MURRAY

Re-creating Reginald Fessenden's Liquid Barretter, Part 2 — Performance Evaluation

Robert retired recently as Professor, Community Health Sciences, University of Manitoba, but still keeps his hand in. Note the absence of any link to the electronics industry. His hobby career in antique radio follows a more or less typical series of evolutionary stages. He began about 25 years ago by collecting almost everything in sight. After a decade or so he decided to focus his collection on Canadian-made broadcast receivers of the 1920s. Three years ago he donated the Canadian items in his collection to Canada's National Science and Technology Museum. His acquisitions have now slowed to a trickle, and he directs his attention to documentation of the history of early Canadian radio manufacturing and related topics. The next phase will be...



RONALD R. THOMAS, W8QYR

Amateur Radio in the 1950s: Romance and Reality

Ron is a communications specialist in Atlanta. He received a Bachelors Degree with honors from Youngstown University and a Diploma in Advanced Communications Engineering from the Cleveland Institute of Electronics. Ron has written over 100 articles and two books on telecommunications. He holds an Extra Class amateur radio license, a Second Class Commercial Radiotelegraph license, and a First Class Commercial Radiotelephone license. He served as a Communications Electronics Officer in the U.S. Air Force at Cape Canaveral and held the rank of Captain. 

TELEVISION

EDITED BY **RICHARD BREWSTER**, 145 LITTLE PECONIC BAY ROAD,
CUTCHOGUE, NY 11935 PLEASE INCLUDE SASE FOR REPLY.

Michael Bennett-Levy

Last summer I finally had a chance to meet Michael Bennett-Levy, visit his castle in Scotland, and view his amazing television collection. My wife, Susan, and I happened to be in Dundee on business and we seized the opportunity. It was one of the highlights of our time in Scotland.

Michael's wide-ranging interests make him something of a modern-day Leonardo daVinci.



Michael Bennett-Levy at Monckton House.

He seems to become deeply absorbed in whatever he comes in contact with. One of his recent purchases was a Birch Ornamental Turning Lathe, an incredible piece of 100+ year-old technology, and he has begun the challenging task of learning how to use it. Michael says "It's a project for my retirement." But to me it appears to be a project for a lifetime.

And the castle! Yes, Monckton House is a genuine castle, fifteenth century or maybe earlier. The kitchen restoration is something to behold. It's every bit as impressive as the one we saw at Hampton Court, home of Henry VIII. But the television museum was the major reason for our visit. And we weren't disappointed. It just goes on and on through one room after another.

In response to my query, Michael later wrote,

"I started collecting early televisions because they were important and that they seemed to have been somehow neglected." In fact Michael's grandfather, Dr. Leonard Levy, was a prominent television engineer in the 1930s. He developed the CRT phosphor that made modern television possible.

Although Michael's interest in early wireless dates back to 1973, he didn't become involved in TV until 1991. Just three years later, he wrote and published the well-researched and beautifully photographed *Historic Televisions and Video Recorders*. This volume includes an appendix that provides a comprehensive listing

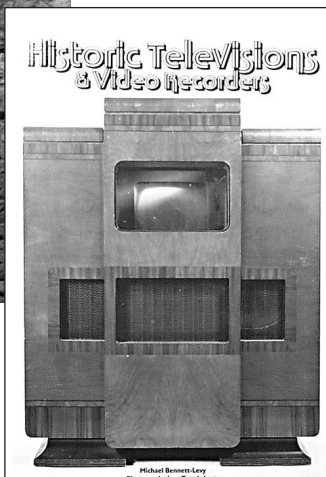
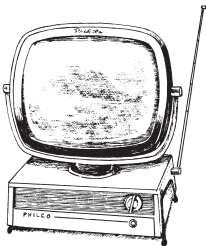
of all CRT televisions made prior to World War II.

A major goal for Michael is the expansion of his television library. He feels that its importance possibly exceeds that of the TV sets themselves. The collection covers the development of television from 1911 to World War II and beyond in Britain, USA, Germany and France.

Another publication of Michael's is *TV is King* (1994). It was released in conjunction with an

exhibition of his sets at Sotheby's in London. A video of the same name was also made incorporating an exclusive interview with Manfred Von Ardenne, the German television pioneer.

Michael's television collection will be exhibited at Bletchley Park near London, World War II headquarters of England's crack code-breaking team, some time this year. Otherwise, next time you are in Edinburgh contact him at michael@rare78s.com. You may be able to arrange for a personal tour of his fine collection!



Cover of *Historic Televisions and Video Recorders*.

RADIO REPRODUCERS

EDITED BY **DAVE CROCKER**, 35 SANTUIT POND RD., #4B, MASHPEE, MA 02649
PLEASE INCLUDE SASE FOR REPLY.



The Temple Horn Speaker

Some call it the “ugly duckling” of speakers, but I fell in love with it at first sight. Just had to have it! I speak of the little Temple radio reproducer manufactured by the Chicago Signal Co. for distribution by Parcels & Co. of 68 West Washington Street in Chicago. It was molded, seemingly in one piece, from what the company referred to as a “ceramic material.” In actuality the material is a thick papier maché with a texture resembling rough tree bark. The entire unit is painted spattered green over gray, which Temple said was “a beauty in appearance.”

Although the manufacturer claims the speaker was made in one piece, a careful observer can see where the lower neck of the molded horn was inserted and glued to the base. To hide this joint, more *papier maché* was applied over it, the rough texture making the seam difficult to see.

In 1925 this little horn sold for \$21.00. Temple also sold a wooden, cabinet style speaker with an internal horn priced at \$10.00 more. These are somewhat common, as are Temple’s large series of drum-type speakers with “air column” design. The advertising illustrations for the green molded horn does make it look simply awful. But, pick one up, look it over, and it grows on you.

The simple watchcase reproducer supplied is adjustable and clamps into a crude metal bracket in the base. The only marking on this 2000- ohm unit is a letter “D” over a letter “W.” I have no idea whose logo that is.

The speaker stands just 13 inches high and has an 11-inch diameter bell. The most amazing feature about it is that when you try to weigh the unit, the bathroom scale hardly moves. This is no heavyweight, we’re talking ounces here!

Temple’s advertising slogan was aimed at radio users who were dissatisfied with what they were hearing. They were advised: “Don’t blame the set...use a Temple.”



The Temple horn speaker.



View underneath the base of the speaker showing the attached reproducer.

RECENT RADIO, TV AND ENTERTAINER OBITUARIES

COMPILED BY **CHARLES S. GRIFFEN WIGYR**

1225 NEW BRITAIN AVE., WEST HARTFORD, CT 06110-2405



Note: When known, the date of death is indicated in parenthesis.

GEORGE "DOC" ABRAHAM, 89, (1-27-05) gardening expert. Mr. Abraham and his wife Katy co-hosted *The Green Thumb* which aired on WHAM(AM) in the Rochester, NY from 1952 until the final program on December 14, 2002. The regional call-in show offered a mix of practical advice on flowers, fruit bugs and lawn care along with his down-home humor and her poetry recitations. After WWII, the couple began a greenhouse business and a syndicated gardening column that eventually reached 5 million readers in 130 newspapers. Together they wrote twenty books including *The Green Thumb Garden Handbook*.

MAX BROWN, 93, (12-15-04) broadcaster. Brown was one of the founders of the farm organization that started the Nebraska Rural Radio Association, which put KRVN(AM) on the air on February 1, 1951. The Association's Rural Radio Network subsequently grew to include KRVN(AM-FM) in Lexington, KNEB(AM-FM) in Scottsbluff and KTIC(AM) and KWPN(FM) in West Point. He served as Executive Secretary of the Association and General Manager of its radio stations from their organization until his retirement in 1979. Brown was inducted the Nebraska Hall of Agricultural Achievement and the Nebraska Broadcasters Hall of Fame.

DR. DAVID BRUDNOY, 64, (12-9-04) radio personality. Brudnoy was the host of *The David Brudnoy Show* on WBZ(AM) in Boston from 1986 until time of death. His thoughtful treatment of politics and culture made him one of the most popular talk show personalities in New England. Prior to joining the station Brudnoy was a talk show host with WHDH(AM) from 1976 to 1981 and with WRKO(AM) from 1981 to 1986. He also worked as a television commentator at WGBH(TV) from 1971 to 1975, WNAC(TV), now WHDH(TV), from 1973 to 1983, *CBS Morning News* in 1975, WCVB(TV) from 1991 to 1993 and WBZ(TV) since 1993. Brudnoy was an accomplished writer of books, reviews and essays and taught history, philosophy, politics and communications at Boston area colleges and universities.

JOHNNY CARSON, 79, (1-23-05) come-

dian. Carson, who became the most popular television star American has ever known, was the host of *The Tonight Show Starring Johnny Carson* from October 1, 1962 to May 22, 1992. He dominated late-night television with an audience of between 10 million and 15 who enjoyed his "droll, puckish, near-effortless" style of comedy and topical monologues. While in college Carson worked at KFAB(AM) in Lincoln, NE and after graduation he wrote comedy and announced commercials at WOW(AM) in Omaha, NE. Soon after their television station, WOW(TV), signed on the air in 1949 he hosted a 15-minute show, *Squirrel's Nest*. Carson moved to Los Angeles in 1950 to become an announcer for KNXT(TV), now KCBS(TV), and later had his own program, *Carson's Cellar*. Soon he was writing for NBC Television's *The Red Skelton Show* and made his first appearance as a comedian in their *All Star Revue* on December 27, 1952. He also appeared on the following television programs: *Earn Your Vacation* (CBS 1954), *The Johnny Carson Show* (CBS 1955-1956), *Who Do You Trust?* (ABC 1957-1962) and *The Sammy Davis Jr. Show* (NBC 1966). He received six Emmy Awards and was presented with the Presidential Medal of Freedom by President George H.W. Bush in 1992.

OSSIE DAVIS, 87, (2-4-05) actor, writer, director and producer. Throughout his theatrical career Davis championed artists rights, human dignity and social justice. He performed in many Broadway productions, including *Anna Lucasta*, *The Wisteria Trees*, *Green Pastures*, *Jamaica, A Raisin in the Sun*, and *I'm Not Rappaport*. Davis made his Broadway debut in 1946 in *Jeb*, where he met his wife, actress Ruby Dee. In 1961 he wrote and starred in the critically acclaimed musical *Purlie Victorious*. Between 1950 and 2005 Davis appeared in nearly eighty films such as *Roots: The Next Generation*, *Doctor Dolittle*, *Get on the Bus* and *I'm Not Rappaport*. He also wrote and directed many films including *Cotton Comes to Harlem* and *Countdown at Kusini*. Davis was a cast member on the following television shows: *B. L. Stryker* (ABC 1989-1990), *Evening Shade* (CBS 1990-1994), *John Grisham's The Client* (CBS 1995-1996) and

Promised Land (CBS 1996-1998). He also made over fifty guest appearances on TV shows from 1955 to 2005. At time of death he was working on a film called *Retirement*. Davis was inducted into the Theater Hall of Fame in 1994 and received the Screen Actor's Guild Lifetime Achievement Award in 2001.

SANDRA DEE, 62, (2-20-05) actress. Dee, a teen idol during the 1960s, was best known for her film roles in *Gidget* (1959), *Tammy Tell Me True* (1961), and *Tammy and the Doctor* (1963). She also had youth roles in adult films, including *Imitation of Life* (1959) with Lana Turner, *A Summer Place* (1959) with Richard Egan and Dorothy McGuire and *Romanoff and Juliet* (1961) with Peter Ustinoff and John Gavin. Her first film after a modeling career was *Until They Sail* (1957). There was renewed interest in Dee last year with the release of *Beyond the Sea* a biographical film about her late husband Bobby Darin to whom she was married from 1960 to 1969. They appeared together in several films including *If a Man Answers* (1962) and *A Man Could Get Killed* (1966). Some of her notable television guest appearances include *Frasier* (NBC 1994), *Fantasy Island* (ABC 1983), *Night Gallery* (NBC 1972) and *Love, American Style* (ABC 1972).

SIDONIE GOOSSENS, 105, (12-15-04) harpist. Goossens was the Principal Harpist of the BBC Symphony Orchestra when it gave its first public concert under its founder, Sir Adrian Boult, in October 1930 until she retired in 1980. Goossens made her professional debut in 1921 at a Prom concert and played the harp for the last time in 1991, at age 90, at the Last Night of the Proms. She was the first harpist to broadcast on radio in 1923 and the first on television in 1936. Goossens was also the first female to tour with the London Symphony Orchestra. In retirement, she taught, was involved with new music and played frequently with the London Sinfonietta and the Fires of London.

KARL HAAS, 91, (2-6-05) classical music personality. Haas was the host of *Adventures in Good Music* syndicated by WCLV(FM) in Cleveland from 1970 to 2003. The program was carried by hundreds of radio stations in the United States, Australia, Mexico, Panama and world-wide by the Armed Forces Radio Service. The show began on WJR(AM) in Detroit in 1959 when he was asked to create a one-hour program of classical music and commentary. Prior to this Haas played the piano and conducted a chamber orchestra for a weekly program on the Canadian Broadcasting Corporation. He began his broadcasting career in Detroit in 1950 doing weekly previews of the Detroit Symphony concerts.

Hass was the first classical music personality to be inducted into the Radio Hall of Fame in 1997.

GEORGE HERMAN, 85, (2-8-05) broadcast journalist. Herman was a political reporter for CBS News from 1944 until his retirement in 1987 and was the longest serving host of the network's public affairs program *Face the Nation* (1969-1983). He was the White House correspondent during the Eisenhower and Kennedy administrations and co-anchored coverage of the Senate hearings on Watergate in 1972. Herman began his television career analyzing the caucus results for Harry Truman at the 1948 Democratic Convention, the first televised national political convention. He covered all the political nominating conventions from 1956 through 1980. Herman joined CBS as a radio news writer in 1944 and in 1949 reported from Asia as a stringer returning home in 1950 to be named a CBS News correspondent. Prior to joining the network he worked for WQXR(AM) in New York City.

GEORGE P. JOWDY, WKBO, 86 (11-21-04) radio engineer. Jowdy helped construct a number of radio stations in New Hampshire and Massachusetts including WEZE(AM) in Boston), WLAW(AM) in Lawrence and WHDH(AM) in Boston. He finished his career at WCVB(TV), Channel 5, in Boston. He trained at a number of technical schools including Radio Engineering and Maintenance School in order to become a radio operator on board Coast Guard and Navy ships during WWII.

VIRGINIA MAYO, 84, (1-17-05) actress. Mayo, one of the great beauties of her era, appeared in nearly sixty films and gave one of her most memorable performances in *White Heat* (1949) opposite James Cagney. Additional film credits include *The Best Years of Our Lives* (1946) with Dana Andrews, *Captain Horatio Hornblower R.N.* (1951) with Gregory Peck, *The Silver Chalice* (1954) with Paul Newman and *Along the Great Divide* (1951) with Kirk Douglas. Mayo also acted in comedy roles with Bob Hope and Danny Kaye. Her last film was *The Man Next Door* (1997). She began her career as a dancer with the St. Louis Municipal Opera Company in 1937 but later joined a vaudeville act called "Pansy the Horse." In 1943 she came to the attention of Samuel Goldwyn who gave her a small part in the movie *Jack London*. Some of Mayo's notable television appearances include *Toast of the Town* (CBS 1954), *Lux Playhouse* (CBS 1959), *Burke's Law* (ABC 1965), *Night Gallery* (NBC 1971), *Remington Steele* (NBC 1984) and *The Naked Truth* (NBC 1997).

JOHN RAITT, 88, (2-20-05) actor and singer. Raitt, a handsome baritone, began his Broadway

career in the role of Billy Bigelow in *Carousel* in 1945. In 1954 he appeared with Janis Paige in his second Broadway hit *The Pajama Game* and co-starred with Doris Day in the movie version in 1957. In 1957 Raitt was the leading man opposite Mary Martin in a national tour of *Annie Get Your Gun* which later that same year became an NBC-TV special. He also had leading roles on tour or in summer stock in such musicals as *Man of La Mancha*, *Fiddler on the Roof*, *South Pacific* and *Kiss Me Kate*. His television credits include being a cast member on *The Buick Circus Hour* (NBC 1952-1953) and *The Chevy Show* (NBC 1958-1959) and making multiple appearances on *The Toast of the Town* (ABC 1950s), *The Bell Telephone Hour* (NBC 1960s) and *Shirley Temple's Storybook* (ABC 1950 & 1960). Raitt began his career with the Los Angeles Light Opera Company in 1940.

BILL SHADEL, 96, (1-29-05) broadcast journalist. Shadel joined ABC in the late 1950s and was one of the rotating television anchors for ABC evening news. In 1960 he was chosen to moderate the third presidential debate between Richard M. Nixon and John F. Kennedy. He was the first host of *Face the Nation* (CBS 1954) and participated as a panelist on *Capitol Clock Room* (CBS 1949-1950), *The Facts We Face* (CBS 1950) and *Focus on America* (ABC 1962). Shadel was reporting on the war in Europe for the *American Rifleman* magazine when Edward R. Murrow retained him as a stringer for CBS Radio in 1944. He later gave firsthand reports on the D-Day landings and the Buchenwald concentration camp. After the war he worked for CBS Radio in Washington, DC and then moved into television as a reporter for a local news program anchored by Walter Cronkite on WTOP(TV). Shadel left the news business in 1963 to become a communications professor at the University of Washington where he remained until retiring in 1975.

ARTIE SHAW, 94, (12-29-04) jazz clarinetist and band leader. Shaw's clarinet rendition of *Begin the Beguine* recorded in 1938 made him a contender for Benny Goodman's "King of Swing" title. Some of his other record hits include *Frenesi*, *Lady Be Good*, *Star Dust*, *Indian Love Call* and *Back Bay Shuffle*. In 1938 the band began a successful engagement at the Hotel Lincoln in New York City. Remote radio broadcasts from there provided him with a nationwide audience. He spent much of his musical career trying to find the right musical identity and over the years formed new bands in 1940, 1941, 1942, 1943 (Navy band), 1944, 1949 and 1953. Although he had one of the best swing bands he

struggled with success and at times would quit and go into hiding. While playing with a small group at The Embers in New York City in 1954, at age 43, he announced his retirement. He never performed again. The Artie Shaw Orchestra was heard on the *Burns and Allen Show* (NBC 1940-1941) and *The Old Gold Hour*, also called *Melody and Madness*, (CBS 1938-1939 & Blue Network 1939). He began his professional career with the Johnny Cavallaro Band in New Haven, CT.

JIMMY O. SMITH, 76, (2-8-05) jazz organist. Smith, the legendary "Emperor of the Hammond Organ," helped make the organ one of the most popular sounds in jazz during the mid-1950s. Although he didn't introduce the organ to jazz he is credited with making it a legitimate option for keyboard players as he broke new ground over the years. Smith formed his first trio in 1955 and performed at clubs in the Philadelphia area before opening at the Club Bohemia in New York City in 1956. He recorded 30 record albums for Blue Note before leaving for the Verve label. Smith was preparing for a national tour with fellow organist Joey DeFrancesco, to promote their Concord Record release *Legacy*, at time of death.

ROBERT "SUNNY" SPENCER, 75, (2-5-05) singer. Spencer sang with the *Sons of the Pioneers*, a western musical group formed by Roy Rogers in the 1930s, for twenty-two years. He was a self-taught musician who played 22 instruments. On his trade mark song, *Mamma Don't Allow No Music Playin' Round Here*, he used seven of them – guitar, saxophone, banjo, trumpet, fiddle, clarinet and jug. During Spencer's career he worked with Al Hirt and Pete Fountain at the 500 Club in New Orleans, appeared regularly on *The Midwestern Hayride* originating from WLS(AM) in Chicago in the early 1950s and served as Musical Director for Gene Autry and Rusty Draper. He led the Sunny Spencer Orchestra, and the Sunny Spencer Trio, performing for many years at the Hacienda and Frontier Hotels in Las Vegas.

JOHN L. TATTA, 84, (2-3-05) cable television pioneer. Tatta was a founding executive and board member who helped build Cablevision Systems Corp. into one of the nation's leading telecommunications companies. He served as President of Cablevision from 1981 until his retirement in 1992. In 1966, at Cablevision's predecessor, Sterling Manhattan Cable Television, he partnered with company founder Charles F. Dolan in New York City to build and market the nation's first urban cable system. One of Tatta's first assignments as Executive Vice President and Director of Operations was to oversee the task of
(continued on page 21)

BREADBOARDING

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*Bring Historical Circuits to Life
On Your Workbench!*

Subminiaturizing the SW-3

For some time I had been tripping over a box of tiny subminiature, or pencil, tubes, all NOS in their boxes, and was thinking of selling them off. But then I found an Internet website (1) operated by WA2ISE with good data on all the tubes I had, and then some. Any excuse I had for not making use of my little hoard vanished instantly. In preparing for a Breadboarding column on using these tubes (2), I found myself actually constructing a receiver using them.

In contemplating what form this receiver would take, I remembered the good old National SW-3. It was made in several variations over the years, but basically kept the same design: a three-tube regenerative circuit using r.f. amplifier, detector and audio amplifier (earphone level only). In the interests of economy, this depression-era radio had no power output tube.

My Design

I decided to follow the SW-3's general design, except that I would include a power output stage. Looking over my stock of tubes, I chose the following lineup, all with 6 volt heaters:

RF: 5636 pentode

Detector: 5636

Audio: 5840 pentode

Output: 5902 pentode

These little tubes all want plate supply limited to 120 volts. They have 8-pin wire lead bases, so I would need to wire them in directly or find special sockets. Electronic Goldmine (EGM) had some 10-pin round IC sockets on sale a half a buck each. They looked like they'd work well.

I wanted to squeeze the set down to the smallest package I could manage while still using a safe, line-isolated design. I started with a 12 volt AC wall wart, which would give the receiver an isolated 12 volt input source. Tube heaters would be in series-parallel, and a reversed 12 low-voltage transformer would provide B plus. EGM offered a wide line of small affordable transformers from Mag-

neTek. I selected a 15 volt 2 watt unit.

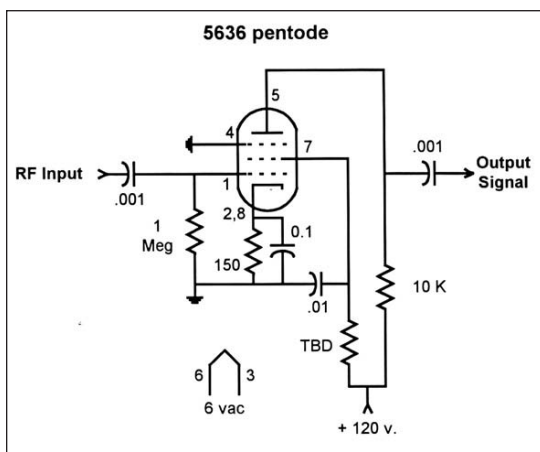
I planned to use toroids for the r.f. coils, since they theoretically have no external field. This would reduce the need for shielding, a problem that had vexed the SW-3 designers.

The RF stage can be fairly broadly tuned in this circuit. I modified a mica padder to get a maximum capacitance of about 180 pF and mounted the unit so that it could be coarsely tuned with a 6-32 brass screw through the front panel.

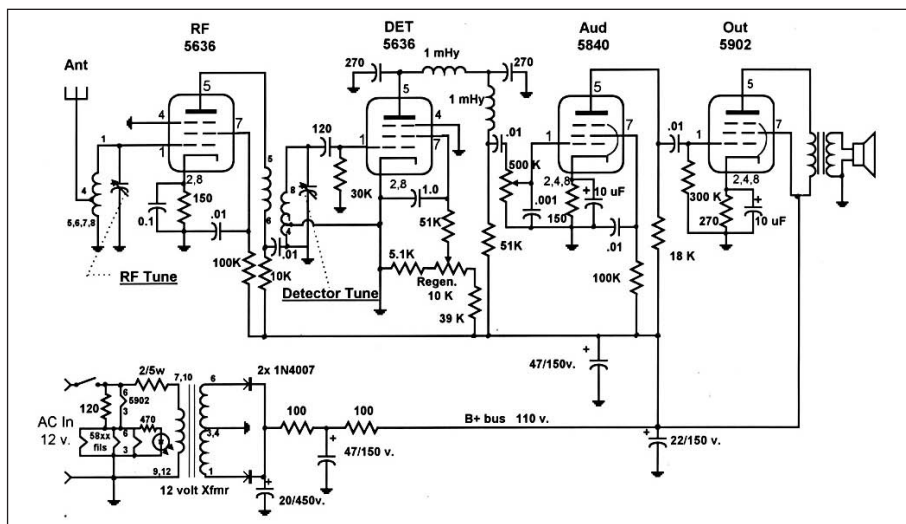
For the detector stage I had an air variable, about a one-inch cube. Tuning would be touchy, so I epoxied a 2½-inch drum on its tuning shaft to accept a dial cord. Even my knobs could be small - ¼-inch shafts on miniature controls.

All together it looked like I could get it the whole receiver into a package measuring 3½ by 6½ by 2½ inches, including a 2½ inch speaker. On the panel would be two tuning knobs, a regeneration control, an audio gain pot, an on-off toggle, and tiny red LED "power on" indicator.

The chassis would be made from pieces of copperclad soldered together, and the parts would mount on a fiberglass perfboard surface. Prior to construction, I laid all this out on cross-hatch paper at full scale.



The r.f. stage as set up for experimentation. Resistor "TBD" was chosen for maximum r.f. gain.



Complete schematic of the "subminiature SW-3."

Breadboarding

The next thing I did was to breadboard each tube in a test circuit. As an example, I'm including a schematic of the RF stage as it looked while I experimented to find the optimum resistor values. As I tested each tube, I found circuit values that gave me the best gain using the conditions set forth in the web page data files.

The regenerative detector stage came out nicely—a Hartley oscillator with screen grid control, just like some versions of the SW-3. My pre-breadboard lashup showed me that screen voltage would need to be adjustable between 10 and 30 volts.

I wound toroids using several different forms until I found one that would tune the 6-14 MHz range using the air variable cap and achieving a reasonable Q. The ferrite form I wound up using is about a half inch doughnut, blue-colored. I wound it full of No. 28 AWG enamel wire with a tap at 25%, and wound a half-winding of the same over it for an RF drive winding. The coil is wired to an 8-pin IC header, and it plugs into an IC socket. The antenna coil is similar, but with only one winding and six turns over it for antenna coupling.

I was able to get 800 milliwatts from the 5902, transformer-coupled into my 45 ohm speaker. I also tried a transformerless circuit using the speaker as the load for a triode-connected 5902 cathode follower. However this provided only 22 mW using the same drive level. Too bad—my set would need two transformers, one for line isolation and one for audio output.

Construction

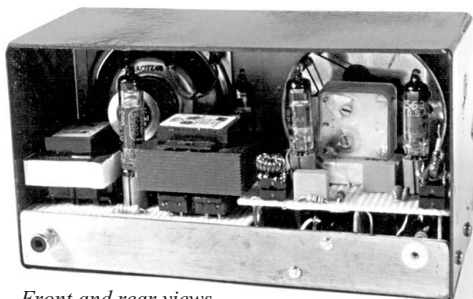
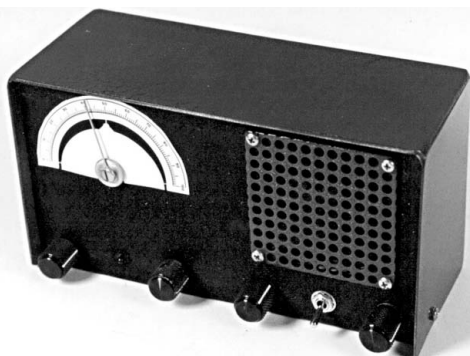
I started by cutting out the pieces of 1/16-inch double-sided copperclad to the measurements on my cross-hatch paper. They solder together pretty easily, although it can be tricky to obtain right-angle joints; the pieces tend to draw into very slightly acute angles as you solder the seams. Spot soldering helps reduce this tendency.

After making the chassis and spraying the panel with black-wrinkle paint, I mounted the two transformers on perfboard. The footprints of the tube sockets didn't match the perfboard holes, so new holes had to be drilled.

Using thin teflon hookup wire and my smallest soldering iron, I mounted resistors and small coupling and bypass caps on the perfboard. Things went well until I discovered the tuning cap had gotten misaligned and shorted out with all the handling. I replaced it with a junk plastic film tuning cap from a transistor radio, glued to a wood spacing block. As the circuit took shape, I made voltage checks and small circuit fixes. The perfboard piece was mounted onto the chassis using bits of bare wire bent into hairpin shapes.

Powering Up

With the tube leads trimmed to the right length and after final voltage measurements were made, the circuit came alive, and I heard RF hiss through the tiny speaker. Adding a bypass cap here and there plus squeezing in an extra B+ filter cap quieted unwanted buzzes and hum, and I started picking up stations. ☐



Front and rear views
of the finished receiver.

After making a crude paper dial and a wire pointer, I created a tuning chart, finding that the set would tune from just below 5 to near 14 MHz, with crowding at the top end. Before fine-tuning a particular station, I set the detector tuning near a desired frequency, then peak the RF control for maximum signal.

With only a six-foot wire, I picked up all the usual powerhouses: WWVH, Deutsche Welle, BBC, plus lots of religious programming. A 40-foot wire outside brought in lots more stations, but they were tough to tune separately.

I wanted, also, to make up a set of coils for the broadcast band. My small cores would have lower Q at lower frequency, so tuning would be too broad, and selectivity would suffer accordingly. I would need a physically larger core to help raise Q and improve things in the BC band. I found a Web site (3) where core materials were explained and a good selection could be ordered.

OBITUARIES, continued from page 18

laying underground cable in Manhattan. In 1967 he helped pioneer the cable-casting of New York Knicks and Rangers games from Madison Square Garden and became the first cable television operator to win exclusive professional sports rights. Tatta remained an active board member and company consultant until his death.

RUTH WARRICK, 88, (1-15-05) actress. Warrick is probably best remembered for her role as Emily Monroe Norton Kane in the film *Citizen Kane* (1941) starring Orson Welles, who also co-wrote and directed the production. To others she became a household name playing the part of Phoebe English Tyler Wallingford on the ABC Television soap opera *All My Children* from 1970 to 2005. Warrick also appeared on three other TV series: *The Guiding Light* (1953-1954), *As the World Turns* (1956-1960) and *Peyton Place* (ABC 1956-1967). She also made many guest appearances on TV shows from 1951 to 2005. Warrick appeared in nearly forty

When I wound a pair of coils using $\frac{7}{8}$ -inch cores, results in the BC band were OK, though not as good as airwound coils and air variable caps could give. The mica RF tuning capacitor had to go—its range was not enough to tune across the BC band, so another film variable of 25-280 pf went into the space.

Questions? Comments? Want a parts list, some tubes, or some small ferrite cores? Send mail to me with an SASE. I'd welcome any suggestions for future columns, too. My email is: rparks9@cox.net

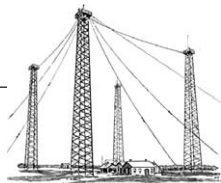
REFERENCES:

- (1) <http://www.pw2.netcom.com/~wa2ise/radios/pencil tubes.html>
- (2) May 2001 *OTB*; "Big Tubes-Little Tubes"
- (3) Ocean State Electronics, Inc. Web site: http://www.oselectronics.com/ose_p88.htm

other films including *The Corsican Brothers* (1941) starring Douglas Fairbanks, Jr. and *The Great Bank Robbery* (1969) with Kim Novak and Zero Mostel. She also performed on Broadway in *Take Me Along* (1959) with Jackie Gleason and *Irene* (1973) with Debbie Reynolds.

Information for this column was obtained from *The Big Bands* (4th ed.), *The Complete Directory to Prime Time Network and Cable TV Shows 1946-Present* (20th edition), *The Encyclopedia of Jazz*, *The Hartford Courant*, *On the Air: The Encyclopedia of Old-Time Radio* and www.boston.com, www.broadcastingcable.com, www.cablevision.com, www.cbsnews.com, www.wclv.com, www.ieee.org, www.imbd.com, www.journalstar.com, www.krvn.com, www.latimes.com, www.legacy.com, www.newsvote.bbc.co.uk, www.nytimes.com, www.playbillarts.com, www.thehistorymakers.com, www.wb1030.com, www.wclv.com and www.wham1180.com.

Thanks to Jeff Kitze and Dr. David A. Wunsch for additional source material. ☐



The Frequency Selective Voltmeter as a VLF-MF Radio Receiver

When you think "radio receiver" what comes to mind?" A World War I era crystal set? A 1920s battery set? A late 1930s communications receiver? A modern multiband portable? But how about receiving with a piece of test equipment?

You might raise your eyebrows, but lurking behind the plethora of front panel knobs on some types of test equipment might well be a radio receiver that can open up new frequencies for you to explore. Hopefully this article will entice you to consider resurrecting a classic or recent piece of test equipment that will expand your listening horizons.

Before we do anything else, let's define what we mean by "radio receiver." In a prior article on natural radio I used the following definition:

A radio receiver is a "transducer" that converts electromagnetic energy into a domain that we can hear, see, or further process using additional electronic/computer devices.

This comes close to being a generic definition of a radio receiver. That definition, at least in my mind, generically defines radio receiver. Using this definition, a crystal radio is as much a re-

ceiver as a sophisticated communications set.

The Frequency-Selective Voltmeter

Just what is a frequency-selective voltmeter?" Basically it's a manually-tuned spectrum analyzer/radio receiver with a voltmeter-type step attenuator and a good quality large meter movement graduated in dBm¹ and volts. Since its purpose in life is to measure the r.f. voltage appearing in a system under test, the design will not commonly have an AGC or AVC circuit. Now suppose that a BFO circuit followed by an audio amplifier circuit driving a speaker or earphone was added to the voltmeter circuit/indicating meter. Presto, we have a "radio receiver!" The specifications found in data sheets for the more modern frequency selective voltmeters use many of the same parameters we commonly see listed for a high-performance communications receiver. These include shape factor, noise floor, dynamic range, harmonic distortion, spurious response, drift, tuning accuracy, etc.

You may be asking yourself "Can I use my station radio receiver as a frequency selective voltmeter?" Yes, but only up to a point. The fre-

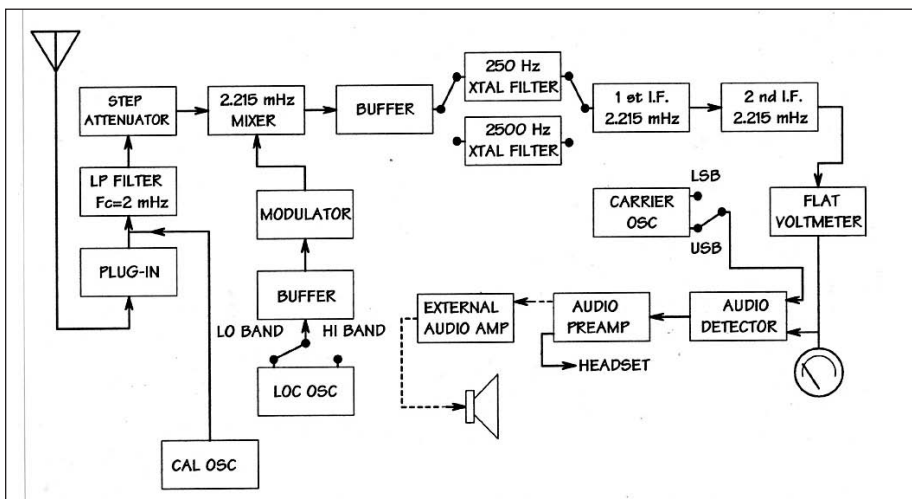


Fig. 1. Simplified block diagram of the Model 126B frequency-selective voltmeter.

MODEL 126B TUBES AND SIGNAL DIODES

STAGE

TUBE / Signal Diodes

Plug-In Module	none unless using the 126B/PA High Impedance Plug-In, which has one subminiature 8071 triode (See the last Internet Reference)
Calibration Oscillator	12AU7
2 MHz Low Pass Filter	none
Step Attenuator	none
2.215 MHz Mixer	.6AH6
Modulator	Hughes 1812 germanium diodes
LO Buffer	1/2 12AU7
Local Oscillator	1/2 12AU7
Mixer Buffer	.6CB6
1st I.F. Stage	.6CB6
2nd I.F. Stage	.6BJ6
Flat Voltmeter	.3-6CB6
Audio Detector	1N34A germanium diode
LSB / USB Carrier Osc	.6EZ8 (9-pin miniature triple triode)
Audio Amplifier	12AX7

quency selective voltmeter has a rigorous calibration procedure to verify its measuring accuracy, for a specified frequency range, over an input ranging from microvolts, or even fractions of a microvolt, through a few tens of volts. Your radio receiver's S-meter circuit is generally not accurate enough to allow for measurement over such a wide dynamic range.

There's also the question of the receiver's gain stability, and flatness over a wide frequency range. However, even a mediocre receiver can be used to perform a "comparative A versus B" measurement through a narrow range of frequency. For example, comparing the subjective performance of two different preselector amplifiers.

The Sierra/Philco-Ford Model 126B

I've owned two different model frequency selective voltmeters, both manufactured by Sierra/Philco-Ford. I was able to successfully use both models as a radio receiver. The first model, which I still have, is a Model 126B. It has the following performance specifications:

Two-position band switch: 5 to 810 kHz and 810 to 1620 kHz
 Detector: USB, LSB and AM
 Input Step Attenuator: 1-3-10-30-etc. progression
 Measuring range: 30 μ V to 30 volts (-90 dBm to +32 dBm)
 IF bandpass: two 8-pole crystal filters, 250 Hz and 2500 Hz

Narrow IF bandpass: 250 Hz 3 dB down / 1400 Hz 60 dB down

Wide IF bandpass: 2500 Hz 3 dB down / 14 kHz 60 dB down

Up converter design: IF frequency ~2.2150 MHz

Spurious responses:

Harmonic distortion >60dB down

Intermodulation Distortion >50 dB down

Direct IF and Image >50 dB down

Physical size: 17" $\times$ 10.12" 14.25" (WHD)

Weight: 30 pounds

The technology level of this mostly all vacuum tube instrument is of mid 1960s. A few germanium diodes are used in the modulator and SSB/AM detector circuits. There should be little trouble reconditioning and maintaining one of these units. All that is needed is a working knowledge of tube-type SSB receivers. I'm including a simplified block diagram of the 126B set as Figure 1.

My other frequency selective voltmeter was a simpler version with no IF crystal filter and only an AM detector. I'm not sure of the model number. Neither unit is capable of directly driving a loud speaker. However both models are able to drive earphone sets having a number of different impedances. Sierra did offer an optional "addon" solid state Universal Speaker Kit for use on various model frequency selective voltmeters. For 126B application the kit was bolted to the in-

side of the cabinet and drew its power from the 6.3 VAC filament circuit.

My 126B, reasonably clean, but definitely used, Was purchased at the 1982 Dayton Hamvention for \$25.00. The seller had no manual. I purchased the manual in 1983 for \$10.00 from the successor company, Lear Siegler, Inc., Sierra Electronics Division, Menlo Park, CA². The simpler model cost me \$5.00 a local Sunday flea market. I bought a Boonton 260-A Q-meter for \$10.00 at the same time. It's amazing what you can occasionally find among the everyday household items offered at flea markets and yard sales!

Using the 126B as a Receiver

Though the 126B has no front-end RF amplifier, I was pleasantly surprised by its performance. I found that by experimenting with clip-lead lash-up antenna tuning units, I could dig many signals out of the mud at the receive frequency of interest! Antenna resonance was clearly indicated by a rise and fall of the 126B's voltmeter and earphone audio volume as I slowly varied the tuning unit's capacitor through its range. Tuning sometimes increased the indicated signal strength by a (voltage) factor of 6 to 8, or 15 to 18 dB!

My antenna and a schematic for the lash-up antenna tuner are shown in Figure 2. The tuner for 120 to 500 kHz was nothing more than a large value 4-section variable capacitor resonated with one or two ceramic form, plain solenoid wound, taped inductors. For snooping around at frequencies between some 50 to 120 kHz I use what I recall to be a variety of 3-terminal TV horizontal width coils removed from junked TV sets.

I am not able to resonate my antenna system below about 50 kHz using my junk box stash of variable capacitors and inductors. When the Omega navigation system was still on the air I had no problem receiving the stations (10-14 kHz). However I had no idea which Omega transmitter site I was listening to³, (1).

The spectrum below 500 kHz contains lots of unidentifiable burps and bleeps, as well as a lot of broad band noise whose intensity seems to vary throughout the day. With the 126B

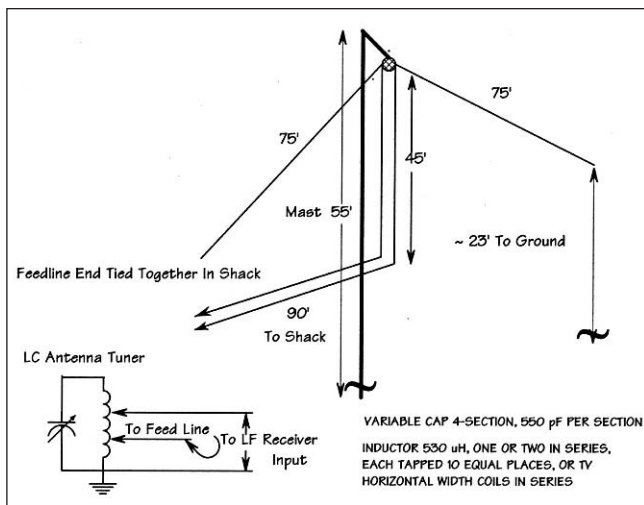


Fig. 2. The author's LF-MF receiving antenna and antenna tuner.

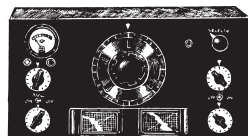
and an appropriate antenna tuning configuration I can receive WWVB at 60 kHz, continuously day or night, year around, at an indicated signal strength of around 3 millivolts! When Lowfers experimenters⁴ commonly used standard CW I was able to receive, from my Pittsburgh location, western PA and Cleveland OH stations at levels of from just over the noise to as much as a few hundred microvolts. I could hear a bushel full of aircraft beacon stations during the day, and many more during the winter months at night. Sometimes I could hear faint snippet of voice and music from European LF broadcast stations.

I've also frequently received very powerful transmissions, apparently FSK, in the range of 22 to 30 kHz. The received signal strength is usually far in excess of 10 millivolts! Once in this same frequency range I copied a 5-letter CW (on-off keyed) cipher code message. It was machine sent at a moderate speed using International Morse Code. I have no idea where these powerful VLF stations are located. My guess, they are East Coast or Great Lakes USN stations.

I used to enjoy monitoring the machine-sent CW plain text US Coast Guard Mariner's Bulletins that were broadcast around 420 kHz. However, these stations were decommissioned when the Coast Guard stopped using CW. For years I have had the intention of building dedicated narrow-band low-gain receiving preamplifiers to improve the 126B's performance for frequency ranges of interest, e.g., 160-190 kHz and around 420 kHz. My intention was to restrict the band-

(continued on page 27)

THE COMMUNICATIONS RECEIVER



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E-MAIL: w2dqb@arrl.net. PLEASE INCLUDE SASE FOR REPLY.

A Depression-Era Receiver For the Beginning Amateur

The Great Depression, which began in 1929, was the worst business crash in United States history. While the entire industrialized world was affected, the U.S., with its modern economy, was hit especially hard. Business activity had dropped over 45% by 1932, and really didn't recover until World War II.

In spite of this gloomy situation, some of the companies in the emerging technologies of aviation and radio managed to survive. But the average citizen had a very hard time of it. With little or no spare cash, Joe Ham had to resort to the simplest equipment for his radio amateur activity. Fortunately he had the *ARRL Handbook* to guide him, and one example of amateur receiver simplicity appeared in the editions of the mid-1930s.

It is interesting to follow the evolution of this little set, which initially reflected the close working relationship between James Millen of the National Company, and the ARRL. (The writer was told by Millen, for example, that layout work on *QST* often was done on the large ping-pong table in his outside radio building.)

In the 1935 *Handbook* version the extensive use of National parts is obvious. By 1938, however, with essentially the same circuit, construction was considerably simplified. The only National parts used were a dial and capacitor. The expensive National S-101 audio coupler was replaced by discrete components of similar value and the complicated National cabinet by a simple aluminum panel and a wood chassis.

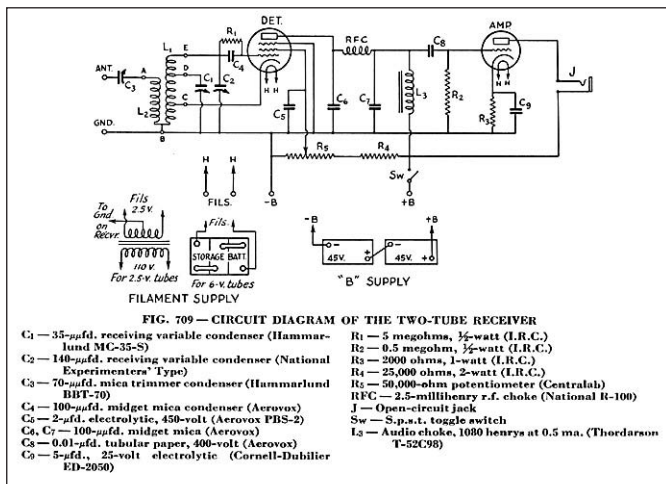
The basic circuit is a pentode regenerative detector, with a triode

audio amplifier providing useable headphone volume. Depending on the tubes, the filaments could be powered by either batteries or an AC supply, while a 90-volt B battery supply was recommended. One departure from the 1935 circuit was that a primary antenna winding was added to the coil.

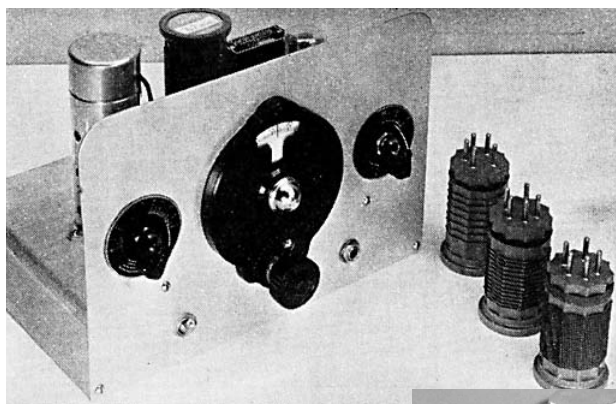
This circuit was hardly new in 1935. The National SW-3 receiver, similar except for its r.f. stage, was already well established in the market. With an added r.f. stage, the little *Handbook* radio could rival the SW3's excellent performance and, with an added audio stage to drive a speaker, might even outdo it.

This particular receiver was purchased by the writer at the AWA Conference flea market a number of years ago. It had been built recently by an AWA member, and I was immediately impressed by the beautiful workmanship. Last month I studied the set with the idea of presenting it in this column. I found that construction generally followed the original 1938 *Handbook* article, although a few changes were noted.

An aluminum chassis had been used instead



Original schematic and parts list from 1938 ARRL Handbook construction article.



The finished receiver as shown in the 1938 Handbook.

of the depression-era $\frac{1}{2}$ " wood platform originally called for. Also, the tube and coil sockets were mounted above the chassis on 1" standoffs, wiring from them passing below the chassis through 1" holes (I surmised that the constructor didn't have a large enough socket punch.).

The 70 uF antenna compression trimmer had been replaced with an APC variable for better stability. The Thordarson 1080 henry audio choke apparently was not available. He had replaced it with a look-alike audio transformer, using one winding as the choke. While the inductance was much less than called for, it did seem to work.

While the coil could remain as mounted, I preferred to have the tube socket connection lugs below the chassis in the usual manner. Since I had the correct chassis punch this change was made. The two electrolytic capacitors and the audio-coupling capacitor were bad, and were replaced. The 5 uF audio cathode electrolytic was replaced with a 10 uF unit, since that was what I had available. Not having the 2 uF cap for the detector screen circuit and questioning the need for that value, I researched other, similar designs. I ended up using a 1 uF capacitor, which seemed adequate to protect the screen from audio modulation. The coil connections were checked and all were in order. The tubes used to match my six-volt power source were a 6C6 and a 76.

The set was powered up using my Heath AC bench power supply, an IP-32 with a variable B+ control. The B+ was set at 100 volts, and surprisingly the set worked on the first try. The coil was marked 5-15 mc, but actually tuned from 5.5 to 14.5 mc. Numerous strong stations came

in around 9.5 mc, using just a 15-foot antenna strung across the basement ceiling. There was some tunable hum from the power supply. With a pure DC supply as originally called for, performance might be better.

This particular radio could use some more work to optimize the components to get the sensitivity and reliability that is needed in even a simple communications receiver. Not



Author's flea market find is very similar in appearance to the Handbook version.

only the values, but the various grounds need to be examined. One technique is to use a common ground bus, and not rely solely on the chassis. Most important, high-impedance headphones are necessary. If these oldies are not available, the modern low-impedance types should work if fed through a standard audio output transformer.

Look back to the depression years of the 1930s and imagine that you are a teenager with few or no financial resources. But you are enamored of radio and you want to build this receiver, especially since the *Handbook* article promises that it will be entirely satisfactory to receive the amateur and other short-wave bands.

A friendly radio repairman has given you some hints on winding coils, arranging shielding, etc. You have wood from apple crates, some pieces of tin, and a few battery sets to scrounge parts from. The audio choke is replaced with an old audio transformer, with the windings series-connected. The dial is a challenge, but you get a vernier movement somewhere. There is no aluminum for the front panel, but a piece of $\frac{1}{4}$ "

wood backed by tin should work. Surprisingly, with a bit of help from your "Elmer," the thing gets built, it brings in signals, and the world opens to you.

The next two years are full of discovery of the wonders of amateur radio. When World War II begins, you enlist in the Marines and are immediately made a sergeant because men with radio experience are in short supply. (This anecdote is factual; it actually happened to a friend of the writer.)

Modern writers often revisit the fascinating subject of simple regenerative receiver circuits. For example, read the series of articles by Bruce Vaughn, NR5Q in *Electric Radio*. He is one of the experts on the subject, having built so many

over the years that he has probably lost count. One good reference is his excellent paper on debugging of homebrew regenerative receivers (*ER* No. 134, June, 2000). After reading this, one wonders how 1930s constructors were able to get the darned things working at all!

Another excellent source of information is author Bob Dennison, W2HBE (for example, see *ER* No. 137, October, 2000) who has written extensively on the subject of regenerative receivers.

Finally, a question: Has anyone else out there built this little receiver? If so, I would be very interested in hearing of your experiences. I can be reached via e-mail at w2dgb@ptd.net, or by phone most evenings at (570) 629-0637. ☐

BELOW 535, continued from page 24

width of the r.f. energy entering the untuned receiver front end to minimize the possibility of overdriving the first converter (mixer). However, since antenna tuning is quite sharp, I've used my time in other ways.

The 126B is not suitable for receiving the "modern" Lowfers transmissions sent in QRSS or derivatives of BFSK (2). The unit's frequency stability and inability to be tuned to an exact frequency is definitely not good enough for these digital modes.

A more advanced frequency-selective voltmeter is described in a recent *Lowdown* article (3). This unit tunes only as far up as 50 kHz. The author uses it as a narrow band analyzer in the audio frequency range. There are many possible applications for a frequency-selective voltmeter as part of a VLF-MF receiver system. One possibility is to use a home-brewed crystal-controlled up or down converter ahead of the FSV. The FSV then acts as a tunable i.f./detector/audio amplifier. There are many published examples using the tunable IF approach, though for higher frequency use:

Do you have an idea or two for using your frequency selective voltmeter? Hopefully this article may prompt you experiment with one of these interesting units, then put pen to paper and share your thoughts and experiences with us in a future *Journal* article.

levels, but one of the power levels is 1 milliwatt.

² Internet search engine results seem to indicate that this Lear Siegler division has been long out of business.

³ In order to identify a particular Omega station you needed to monitor multiple frequencies and measure the transmission duration of each received frequency for at least a 10-second period. You then had to fit the received signals to prescribed patterns in order to determine the Omega station's identity. A single-frequency manually tuned receiver is not able to determine these patterns.

⁴ Lowfer: an acronym for an individual interested in participating in the Part 15, "no-license" band of 160-190 kHz, or monitoring radio transmissions below the broadcast band. ☐

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- (1) F. J. Lotito, K3DZ, "Radio Navigation Systems, VLF through MF, Part 1," *The OTB*, July 2004, pages 40-41.
- (2) <http://www.lwca.org>, search the Longwave Club Of America web site for articles and links to QRSS and other modulation systems used by Lowfers.
- (3) John Reed, "HP 3581C Selective Voltmeter," *The Lowdown*, September 2004, pages 9-11.

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- <http://oak.cats.ohiou.edu/~postr/bapix/Sier126B.htm>
<http://www.tech-diy.com/HP3581/hp3581.htm>
<http://pw2.netcom.com/~wa2ise/radios/penciltubes.html> (including the 8071)

FOOTNOTES

¹ dB is 10 times the logarithm base 10 of the ratio of two power levels, while dBm is 10 times the logarithm base 10 of the ratio of two power

GETTING ON 40 METERS—1929 STYLE

During the Amateur Radio forum at this year's annual conference, it was decided to include operation on the 40-meter amateur band in the 1929 Bruce Kelley Contest. The idea was to give our members in the midwest and west a better shot at getting involved in the fracas. Some were concerned about operating at this higher frequency. They felt that getting a vintage transmitter to operate on 80 was hard enough without going up to 40. But it's really not that difficult if you build the rig described here. I chose the Hartley circuit, which I believe to be easy and sure-fire.

You don't have to be a machinist to get a good vintage circuit operational. Our brethren from the past got by with a lot fewer resources than we generally have today. You'll just need your usual electronics tool kit plus a few other basic hand tools.

Having a nice supply of hardware on hand will make things easier. This would include an assortment of brass wood screws sizes #4, 6 and 8 in lengths from 1/2- to 1 1/4-inch as well as round- and flat-head, nickel plated brass or stainless steel machine screws in sizes #4, 6, 8 and 10 in lengths 1/4- to 1 1/2-inch.

Cad-plated and Phillips head hardware did not exist until after World War II. Before the war, the only screws used in radio had slotted heads and were ALWAYS either bare or nickel-plated brass. I do use stainless steel because it is easy to get and pretty close in appearance to nickel plated brass—which is generally available only from salvaged equipment.

The baseboard is 7 1/2" wide by 12" deep. The front panel is made of 1/4" stock. Both are made of poplar, which I like to use because it's easy to work and takes stain well. I usually use Minwax stain because it looks good without any additional finish. Leave it on for an hour after applying, then wipe off with an old T shirt.

If you like a really dark color, I'd suggest mixing two different colors of Minwax stain. For some reason such a mixture comes out unusually dark. Try different ratios to get the color you like. You might like to mount the components temporarily before staining to make sure everything fits.

Coils and Tubes

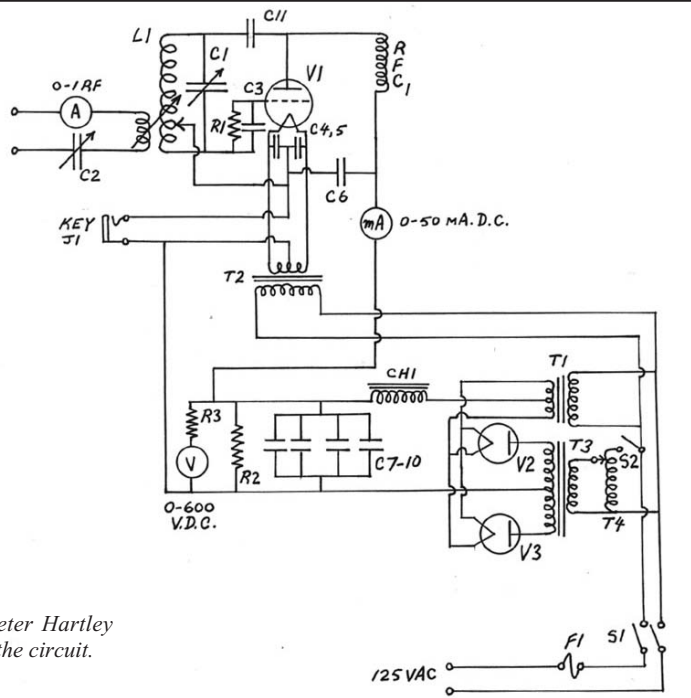
Winding the coils is probably the most difficult part of this project. The plate tank coil is wound with quarter-inch copper tubing. Flatten one end and drill a hole there. You'll need a winding form that is between two and three inches in outside diameter. One of the best forms for this purpose is a short length of PVC pipe. Drill a hole at one end and secure the prepared end of your copper tubing to the pipe using a nut and bolt. This will securely hold the tubing to the pipe as you wind.

Wind the turns together tightly; do not try to space them at this time. After six are wound (12 for 80 meters) remove the coil from the form. Force a small-diameter rod (1/4" or so), such as a screw driver, between the last two turns of the coil. Go all the way through the coil, pushing the rod out through the turns at the opposite side. Holding the rod firmly, spiral the coil though it. This will give you consistent spacing.

The plate choke can be wound on any insulated rod 1/2" in diameter and about 2 1/2" long. Wood or Bakelite were the usual materials back in the 1920s. Drill a hole at each end to mount a standoff insulator. Mount a solder lug 1/4" to 1/2" from each end of the coil half-way across the circumference from the standoff hole. These will give you tie-off points for the wire.

Wind No. 28 to 32 gauge enameled magnet wire close-spaced between the lugs. Clean off the enamel at each end of the coil and secure to the lugs. Later, you'll also use these lugs to wire the coil into the circuit—after which you can solder them. The choke value is not critical. In the unlikely event that it runs hot during operation, just add or subtract a few turns. This concludes the making of homebrew parts. All others are standard, "off-the-shelf" units. Slight variations are OK. *Nothing* in the construction of this transmitter is critical!

This transmitter uses a "HI-C" type of circuit; in other words, the ratio of C to L in the plate tank circuit is high. This design was used to compensate for the relatively high grid-to-plate capacitance of the tube (a characteristic of triodes), which tends to cause frequency drift as the tube



Schematic of 40-meter Hartley shows simplicity of the circuit.

heats up. However, this effect is minimized when the tank capacity is high compared with the tube internal capacitance.

However, HI-C circulating tank current is very high, even in low power circuits, so you need to use heavy connections between the tuning capacitor and tank coil. I suggest making the connections with some of the same 1/4" tubing you used to wind the coil. Wiring from the tube to the tank can be done with any size wire. However, it's best to use No. 16 to 12 because these sizes are rigid; they won't vibrate and cause frequency instability.

A word about tube choice. Up to now, I have always used a much larger tube than the power level called for. The 203A or 211 were my usual choices. In this transmitter I went with the UX-210 and found that frequency creeping became a problem. Substituting a different '10, a Taylor, minimized this effect, but I believe it would have been better to stick with one of the larger tubes or to employ a pair of 210s in push pull.

In the push pull circuit, the grid-to-plate capacitances of the two tubes are in series, which reduces the capacity added across the tank by half and results in better frequency stability. Another cure might be to reduce the tank inductance by one turn, making for an even "higher" HI-C circuit.

It would be a good idea to design your transmitter around a tube you have more than one of. You may find that one works better than the rest. I have several '10s here and they all acted a little differently in this circuit.

Different tube types require different values of grid leak resistor. For the 852, 211, 801 and '10 use 10k. I tried a '50 in place of the '10 and it worked without any changes. You might like to try a '201A, '199 or type '27 at reduced power, but, since I haven't, I don't know what value of grid leak resistor to recommend. In any case selection of the correct grid leak resistor is necessary to produce a clean sustainable note. The use of wire-wound resistors is perfectly OK.

Parts and Parts Placement

To get good results, you need to pay attention to proper component placement. For instance, the electromagnetic fields surrounding the plate tank coil and tuning capacitor can interfere with each other if these components are positioned at 90 degrees. To reduce this interference they should be placed parallel to each other as shown in the pictures. The plate choke will also produce an electromagnetic field and should be placed at a right angle to the tank inductance. Wrong placement of

these components may cause annoying interlocking of different controls.

Wiring position can also couple energy into places you don't want it. For instance, I placed the grid leak under the breadboard to put some distance between it and the tank circuit. In any circuit using grid leak bias it's always best to locate the leak components as close to the grid terminal of the tube as possible. It may not be possible to satisfy both of these requirements so compromises will have to be made.

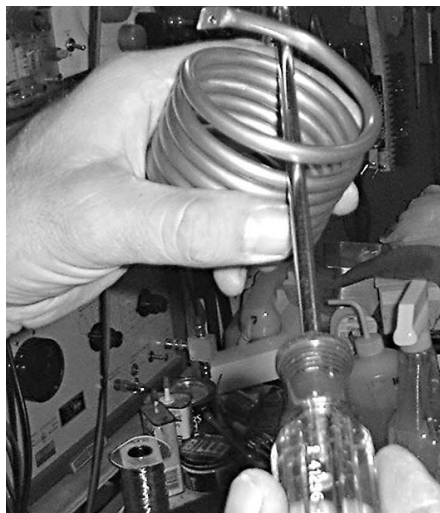
A word about the plate blocking capacitor. This is the capacitor in series with the plate of the tube and the tank circuit. Since this cap will also have to pass RF as well as block DC, a safe rating would be at least twice the plate voltage to be used. It is also important to test the cap for DC leakage. You'll want to be sure to keep plate voltage off the tank circuit in case you come in contact with it, as when adjusting the antenna link coil.

Anything over 30 volts (OSHA specs) could cause death. I like radio but don't want to die for it. If you don't have a capacitor checker one can be made using a 50 to 100 volt DC supply. Connect a 1k to 10k resistor in series with a meter that can register a few milliamperes, the capacitor, and the power supply output. Use a Variac to slowly increase the voltage while watching the milliammeter. The meter will jump at first because the capacitor is charging. When full voltage is reached (100 VDC max.) no significant current should show on the meter.

Capacitor values are not critical. The plate blocking capacitor can be anything from .0001 uF to .002 uF at 1000 working volts or higher. The grid leak capacitor can be between 100 and 500 pF at 200 volts or higher. The filament bypasses can be between .001 and .01 uF at 100 volts or higher; the same range is ok for the plate bypass, but it should be rated at 1000 working volts. With these values no problem should be encountered with breakdown voltage.

The tank capacitor should be between 350 and 500pF. Any good receiving type should be okay. Make sure that resonance occurs with the plates at least $\frac{2}{3}$ meshed. The stator (fixed plates) of the tank capacitor should be connected to the high end of the tank inductor and the rotor (moveable plates) connected to the low, or ground end of the tank inductor.

The tank circuit should be wired so that the antenna-coupling link is at the low end of the tank coil and the plate blocking capacitor is connected to the high end (plate end). Placing the antenna-coupling coil at the high end of the tank coil might produce a higher reading on the antenna ammeter but will also increase the har-



Spacing out the turns of the tank coil using screwdriver as a tool (see text).

monic transfer and make the transmitter more difficult to adjust for stable operation.

The cathode tap will need to be placed about $1\frac{1}{2}$ to $2\frac{1}{2}$ turns up from the ground end of the tank coil. No. 18 to 12 wire is used for this purpose. I fashioned a $\frac{1}{4}$ "-wide copper strap into a clamp for this connection. I've seen tube grid clips and fahnestock clips used for this purpose also. You could also simply solder the cathode tap to the coil after conducting some experimentation to find the best location. Exact placement is not critical. You're looking to make sure oscillation is sustainable and stable, that's all.

Although just about everything built back in the old days had the control knobs mounted right on the tuning capacitor shafts, I'd recommend using an extension shaft to place the capacitor (and its associated tank coil) well back of the control panel. This reduces the effect of hand capacity, which can shift the resonant frequency right out of the band and even stop oscillation altogether.

Results

When first powered up, my "sure fire" Hartley didn't work, but it came to life right after a quick readjustment of the cathode tap. 7Mhz came in at about 60 on the National dial (tank capacitor plates about $\frac{2}{3}$ meshed). The capacitor used was a 400pF Cardwell so this was about right for "HI-C".

The rig would draw up to 40 mA under load with a plate voltage of 375. That equates to 15 watts plate input power. This could be reduced

to the 10 watts specified for the Bruce Kelley contest by reducing the antenna coupling. This also had the effect of reducing key clicks, which were quite bad at the 15-watt level.

Frequency adjustment is a little touchy using the little National dial, which has a ratio of about 6:1. The National type "B" dial, which can be adjusted up to 20:1, would have been a better choice. Also, some type of small-value padding capacitor wired across the tank would facilitate fine tuning.

In my particular station, the use of a series antenna tuning capacitor (250-500 pF) was necessary. My antennas are a ground plane and, on 80 meters, a dipole. I'd also recommend some kind of antenna current indicator. I use an older thermocouple-type meter in the 0-1 amp range. A field strength meter or a small link coil soldered to a flashlight bulb would work equally well. RF ammeters in higher ranges are difficult to read, since the lower end of the scale is often compressed.

With the little rig completed and tuned up, I switched on my 51J4 receiver to see if I could work someone. After calling a few stations I

hooked an OK2 (Czech Republic). Not bad for a first contact with a wobbly .3 Amps on the RF Ammeter!

Power Supply

You should probably build the power supply first because you'll want to try out the transmitter as soon as it is completed. This transmitter will operate from any decent supply that can deliver from 200 to 400 VDC at about 50 milliamps. A lot of you may have such a supply already on hand. The only concern with any DC supply is the issue of dynamic stability (power supply regulation), or how much the output voltage drops under load.

Contrary to popular belief, a huge amount of filter capacitance won't solve the voltage sag problem. Doing this merely helps to compensate for small or instantaneous changes in load resistance. The real cause of poor power supply regulation is a poorly designed or selected power transformer. Such a transformer will have too high a secondary DC resistance or an inadequate current rating.

Start by selecting a power transformer that has a secondary current rating equal to about twice the required amount (in this case at least 100 mA). The rectifier/filter circuit can be of the usual type seen in any radio handbook. Use a choke inductance of 10H or more and a filter cap of at least 20 uF. Don't forget the bleeder resistor. A good rule of thumb is rate this at 100 ohms per volt of output (400 volts = 40,000 ohms) with a power rating of 10 watts or more.

If you don't care about having an original type power supply a series-regulated design would be an excellent choice. In this type of power supply a gaseous regulator is used to supply a reference voltage to the grid of a power type tetrode (series tube) with another tube used in a feedback circuit. See any radio handbook from the 1950s for examples of these systems. They offer excellent dynamic stability, usually have some output adjustability, and can be had in output voltages of from 150 to 450.

Some Final Notes

Avoid the use of key click filters; they only make your cw note more "chirpy." I key all my transmitters in the cathode return or filament transformer center tap. By the way, if you use a center-tapped filament transformer you don't need to use a center-tapped resistor in the filament supply.

Some operators prefer to key the primary of the high-voltage power transformer. This method gives an interesting characteristic to the transmitted signal, but be sure to use a relay so as

PARTS LIST FOR THE 40-METER TRANSMITTER

C1	400pF variable
C2	350pf variable
C3	100-250pF, 1000V mica
C4, C5	.01uF, 600V mica
C6	.002uF or larger, 1000V
C7-C10	10uF, 600V oil-filled
C11	.002uF, 1000V
CH1	10-20H choke
J1	phone jack
L1	tank coil—see text
R1	grid leak—see text
R2	50k, 25-watt
R3	Calibration resistor for milliammeter used as 0-600 voltmeter ("V"). Value depends on full-scale value and internal resistance of meter movement. Not necessary if actual voltmeter is used.
RFC1	radio frequency choke—see text
S1	DPDT line switch
S2	SPST B-plus switch
T1, T2	7.5-volt CT @ 2.5A
T3	700-0-700 V @ 100mA
T4	Variac for output-voltage adjustment
V1	UX-210 or equivalent triode
V2, V3	UX-281
Other meters: "A" — 0-1A thermocouple-type r.f. current meter (optional, see text); "mA" — 0-50 mA plate current meter	

to keep any dangerous voltage off the key (and your hand).

My antennas are all fed using 50-ohm coax so if you plan to go with the old ladder line, some changes in link coil size and series cap may be necessary. This transmitter tuned into the antenna well using a three-turn link and a 350 pF variable. A good way to tell if your selection of antenna coupling components is correct is that there should be adjustment room on either side of optimum.

In other words, if the link coil has to be coupled all the way in before reaching maximum power transfer try adding another turn or two to it. Same with the series capacitor. If maximum power transfer is not achieved with plates fully meshed try a higher value.

Do NOT attempt to capacity couple the tank coil to the antenna. The Federal Radio Commission (yesterday's F.C.C.) outlawed this method as it couples harmonics just as well as it couples the fundamental. No problem with parasitic oscillations should exist if connections are kept short and heavy. Lastly, some type of High Voltage indicator should be employed as a reminder that lethal voltage is present.

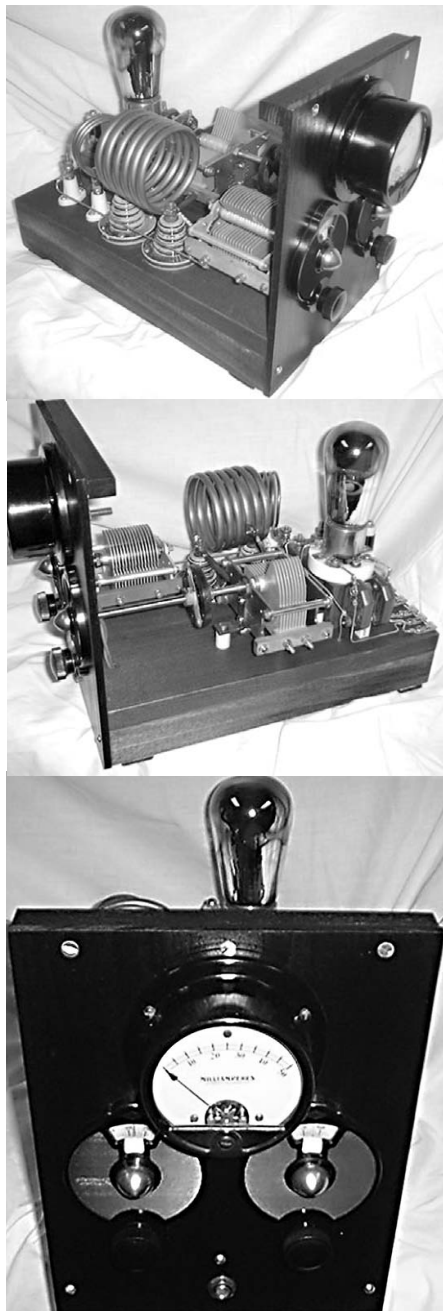
After building and initial adjustment of the Hartley transmitter, I found that, although I was getting the required 10 watts input. I was unable to go to 20 watts without doubling the plate voltage. I finally concluded that I might not be getting enough grid excitation.

In the Hartley there are at least two ways to increase excitation to the grid. 1. The value of grid leak resistance can be increased or 2. The cathode tap on the plate tank coil can be moved more towards the "plate" end of the coil. I decided to try moving the tap half a turn closer to plate end of the coil. I was then able to secure up to 25 watts plate input, with an increase on the RF ammeter from .5A to 1.1A, at the original plate voltage used for 10 watt operation.

Another problem stemmed from my choice of tuning capacitor. It was an old Remler from a broadcast receiver. I liked the fact that it was possible to entirely un-mesh the plates so that capacitance was reduced to 4pF. I can't remember why I thought this would be good, but when I put this capacitor into operation I found it erratic and difficult to set for maximum RF output.

Deciding that the molded bakelite supporting the plates might be the cause, I replaced the unit with a Cardwell "mid-line" of 350pF and everything settled down. I also got a little more RF output.

A note about the power supply. In my case, the voltage dropped about 50 volts from no load to key down. At 500 volts this represents a 10% drop which is OK. The filter is a choke input



Three views of the completed transmitter.

type using a 20H choke and a 40 uF capacitor.

However, when applying load to any supply,
(continued on page 34)

LESSONS FROM LATEN: DIAGNOSIS WITHOUT TEST GEAR

Those who attended the March 5, 2005 Pittsburgh Antique Radio Society meet were treated to an unusual spectacle. Four or five service benches had been set up and staffed with PARS experts who were doing their best to repair tough-dog sets that members had brought in.

One particularly stubborn set would not oscillate, and no one could figure out why. At last the oscillator coil became suspect, but its resistance measured according to specs. "Hmmm," I thought, "this sounds like a case for Laten Fetters".

I coaxed him over to the radio and he listened patiently to all that had been done to it. He sat down and looked into the chassis. Then he looked some more. Finally he pulled a small screwdriver from his pocket and dislodged a piece of debris that was wedged between two of the oscillator socket pins. The radio speaker blared into life, and Laten walked away to the applause of all who witnessed the simple and effective fix.

Laten had taught all those present an important lesson. It's one I have found difficult to learn, even though he has demonstrated it to me often. Sometimes we have to forget our meters, generators, testers and fancy theories and just *look* at the chassis. Of course, not just look, but look with a critical and observant eye. Often observation alone provides a correct diagnosis.

For example, thirty years ago I built a Heathkit stereo receiver. The set played well, but after I had it for a few weeks I noticed that when I would turn a light on or off in the house the FM signal would cut out. I had no idea what could cause this weird behavior, and took the stereo to Laten with my complaint.

A few days later he called to say that the set was fixed. By visual inspection he had noticed a problem with the first FM transistor—a high-input-resistance field effect unit. There was a gap between one lead and the body of the transistor. When he pressed against the lead gently with a wooden stick, he was able to duplicate the intermittent behavior. A new transistor solved the problem.

My most recent lesson in critical observation was learned on an RCA console chassis that I had worked on for a long time. Again, the oscillator was not working properly. The set played well on

my workbench, but would often stop playing when it was in the cabinet.

Laten diagnosed this problem without even plugging the set in. Within minutes of my showing him the chassis he positioned a piece of white paper so he could see it between the closed plates of the tuning capacitor. That showed him that one of the plates was almost touching an adjacent one. Some careful bending fixed the problem. Evidently the plate got just warm enough when the chassis was in the cabinet so that it bent enough to touch its neighbor.

Here is another example of a repair that required no tools, some theory and lots of insight. This experience comes from Laten's early days as an in-home television serviceman. He was called to the home of a woman who complained that the picture on her television would sometimes change into wavy distorted lines.

Having worked on intermittents before, Laten asked the woman if he could just sit and watch her television for a while. So she went into the kitchen to work while Laten observed. Half an hour later he had seen no wavy lines. He called the woman into the living room and asked her to tune in a station as she normally would.

Sure enough, when the woman approached the TV and began to turn its knobs, the picture dissolved into distorted waves. Laten's keen analytical mind determined in an instant exactly where the problem was—how shall we say?—concealed. He asked, "Ma'am, at the risk of getting my face slapped, are you wearing a corset?"

The woman said that she was. Laten asked her to go upstairs, take off her corset and put it in a bag, and bring the bag downstairs. The woman, by now thinking she had possibly called the wrong serviceman, nevertheless complied. When Laten then carried the bag containing the corset to the front of the TV, the picture again became wavy. He realized that the metal stays in the woman's corset had become magnetized and were causing interference with the picture. Just think—whole decades before Jason Timberlake and Janet Jackson had even been born, Laten had already diagnosed a case of wardrobe malfunction! I never asked him how much, if anything,

he charged for that service call.

Another episode in Laten's excellent adventures as a serviceman began when he was called to a large, beautiful house in an opulent section of the city. The maid in the kitchen told Laten where the television was that needed repairing.

"It's upstairs in the master bedroom. Just go up there and you'll find it." A few minutes later Laten was alone in the bedroom working on the set. He couldn't help but noticing a large bunch of bills of various denominations scattered on top of the nearby bureau. Laten worked undisturbed in the room.

It was only while he was driving back to the shop that he realized that the money had probably been placed there as a test of his integrity. Evidently he passed the test; he was soon invited back to install a hi-fi system throughout the entire house.

And here is one last example of why I take radios I can't fix to Laten. Again in his early service days a call came in for at-home television service. When he arrived at the address, he discovered that the apartment was at the top of a long flight of stairs.

After being admitted to the apartment, he asked where the TV needing service was. The woman who let him in motioned across the kitchen and said, "It's right over there under the stove."

Laten went to the stove, which stood on high,

spindly legs, and pulled out a large cardboard box that rested on the floor. In it he found a very bent, beaten-up TV chassis without a cabinet, the speaker dangling from a single wire.

Discrete questioning revealed that she and her husband had had a "discussion" the previous evening, during which her husband had thrown the television set down the stairs (perhaps to emphasize a subtle point he was trying to make). With the storm passed, the couple then retrieved the "important parts" of the set. The destroyed cabinet was discarded, and a service call was placed.

At this point most servicemen would have strongly recommended purchase of a new TV. But not Laten. He set about straightening the chassis, remounting and rewiring the speaker, and making several other adjustments he thought necessary. He then placed the chassis on a cloth on the kitchen table, attached an antenna and line cord, and turned the set on. It worked.

Laten informed the woman that she and her husband could watch the television as it was, so long as neither of them went near the exposed high-voltage section that he pointed out to her. Upon his return to the shop, he ordered a new cabinet for the chassis.

They just don't make chassis of that calibre anymore. And I wonder, do we still have servicemen of that calibre? 

GETTING ON 40 METERS, *continued from page 32*

the voltage drop is usually not smooth and gradual. Viewed the power supply output on an oscilloscope, we might see some ringing which will look like an oscillation. This condition will be exacerbated when the load is a CW transmitter, which is not exactly "soft start." You might check your transmitter note using a monitor or a well-shielded station receiver with the antenna disconnected. Any anomalies will show up.

If you suspect that you have this condition, try increasing the size of the choke or add a swinging choke. I've seen power supply circuits that have a swinging choke in front of the regular smoothing choke with no capacitor in between. Values of from 5 to 25 H for the swinging choke and 20 to 30 H for the smoothing were shown.

Of course some operators like their signal to sound weird but I would like to remind us that the 1929 operators tried their best to get away from RAC (transmitter sounds as if it's powered by unrectified AC) or otherwise unstable signals—and I tend to agree. However, I would like to hear a spark signal come in over the air just once.

Finally, I had some instability in one of my

transmitters that resulted in a rapid shift in frequency. I found that part of the problem was that the voltage at the filament terminals of the UX-211 tube was about 1 Volt too low.

As it happens, I use small Variacs in the primaries of most of my vintage transformers. These older types were rated at 110 to 115 VAC, while my line supply runs 125 VAC. I reset the voltage to the required 10 using a Variac and the problem went away.

One way to get around having to use a Variac to compensate for too-high line voltage on a vintage transformer is to series up any unused secondaries. For instance, my power supply rectifier filament transformer had two 7.5VAC secondaries. The primary was rated at 115V. With my 125-Volt line I was getting 8.5 Volts at the rectifier socket terminals. I decided to wire the unused 7.5-Volt secondary in series with the primary and ended up getting 7.45 Volts at the rectifier sockets. Polarity matters here so check the phasing.

Try and bring your finished transmitter to the annual conference so all can see and enjoy! Any questions? Feel free to e-mail me at hjojofam@comcast.net or stanley.hojonacki@lmco.com. 



AWA ANNUAL CONFERENCE

RIT INN AND CONFERENCE CENTER, ROCHESTER, NY

AUGUST 23-27, 2005 • **THEME: WESTERN ELECTRIC**

WELCOME BACK! At the 44th annual Conference, collectors and history enthusiasts will convene, exchange equipment, and learn more about the development of radio and electronics. If you have never been to the yearly "reunion," why not give it a try? Rochester (Henrietta) is just north of upstate New York's beautiful Finger Lakes region, easily reached by car or plane. The site is 26 easy miles from the AWA Museum in Bloomfield.

Advance registration is encouraged to facilitate pre-assembly of registration materials and pre-assignment of flea market spaces. This will allow you to receive your Conference packet upon arrival at the registration desk with a minimum of delay. Pre-registration, using the enclosed card, can be made through AWA Registration, c/o Patricia Muehlbauer, P.O. Box 108, Stafford, NY 14143. There will be unlimited registration at the door.

The Conference site is the Rochester Institute of Technology Inn and Conference Center. Formerly the Thruway Marriott hotel, this is the same facility where we've been running the Conference for many years. It offers special nightly Conference rates of \$89.00 for a single or double. Get your reservation in early! For info or reservations, call (585)359-1800. The Conference Center has restaurant facilities, and other lodgings and restaurants are nearby.

The hotel is reached from Exit 46 of the New York State Thruway (I-90): take I-390 north to NY 253 west, to NY 15 south. For visitors arriving by air, the location is about seven miles or 15 minutes from the airport. There is shuttle service, 6 a.m.-11 p.m. (specify the RIT Inn and Conference Center). But if you take a cab, make sure the driver understands that you are NOT going to the RIT campus, but rather to the Inn and Conference Center.

Conference Chairperson
HUGH DAVEY

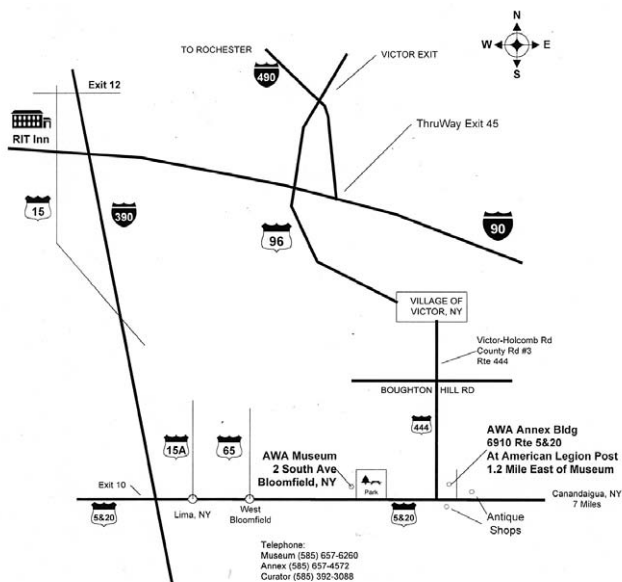
Financial Chairperson
BARNEY WOOTERS

Program Chairpersons
HUGH DAVEY
GEOFFREY BOURNE

Lobby Registration Chairperson
BILL FIZETTE

Contest Chairpersons
GEOFFREY BOURNE
CHRIS BACON

Pre-registration Chairperson
PATRICIA MUEHLBAUER



AWA ELECTRONIC COMMUNICATIONS MUSEUM

VILLAGE GREEN, BLOOMFIELD, NY

Refer to map at left. Directions from hotel: Right (south) on Rt. 15. At Avon (9.5 mi.), left (east) on Rts. 5 and 20. At Bloomfield (16 mi.), left at brown "Radio Museum" sign near Holloway House restaurant. Go approx. 200 ft. and park. Museum is on the left.

HOURS:

Sunday, August 21— 2-5 p.m.
Wednesday, August 24 — 7-9 p.m.
Saturday, August 27 — 2-4 p.m.
Sunday, August 28—2-5 p.m.
Round trip bus transportation to Museum and Annex available Wednesday evening.

AWA CONFERENCE AGENDA

TUESDAY (8-23-05)

- 5 p.m.-7 p.m.—Registration will open in the flea market tent.
- 5 p.m.-7 p.m.—Parking in Flea Market for registering vendors. Selling is not permitted at this time.
- 5 p.m.-7 p.m.—Members' Mixer, cash bar, hors d'oeuvres. Book Fair open for preview.
- 7 p.m.—Body Worn Military Direction Finding receivers and The Newly Discovered Russian Enigma, *Tom Perera*. Seneca-Onondaga Rooms

WEDNESDAY (8-24-05)

- 6 a.m.—Flea Market opens (through 11 a.m. Saturday). Flea Market registration begins. Food service will be available on-site. (Wed. to Fri.)
- 8 a.m.-5 p.m.—Registration for Conference. Assembly Corridor
- 8 a.m.-5 p.m.—Book Fair. Pre-assembly Court
- 11 a.m.—AWA Members' Forum. Be ready with questions, discussion topics, suggestions, regarding the operation/mission of our club. Conducted by AWA President *Geoff Bourne*. Seneca-Onondaga Rooms.
- 2 p.m.—Short Wave Report, *Bart Lee*. Seneca-Onondaga Rooms.
- 4 p.m.—Key & Telegraph Seminar, moderated by *Tom Perera* with presentations by *Russ Kleinman* (Matching Rare Keys with Original Drawings), *Greg Raven* (Telegraph in the Wild West), and *Gil Schlehman* (Unusual Telegraph Patents). Seneca-Onondaga Rooms.
- 6:30 p.m.—Bus to Museum.
- 7-9 p.m.—AWA Museum and Annex Open. Bus leaves hotel at 6:30 p.m. (meet in front lobby) and returns approximately 9:30. Round trip bus fare, \$12.00.
- 7:30 p.m.—Moonlight Restoration Forum, host *Journal* Editor *Marc Ellis* with *Journal* Column Editors *Bill Fizette* and *Ken Owen*. Seneca-Onondaga Rooms. Brief formal presentations on restoration issues, followed by informal group discussion. Bring your own restoration case histories and questions to discuss.

THURSDAY (8-25-05)

- 8 a.m.-5 p.m.—Registration. Assembly Corridor.
- 8 a.m.-5 p.m.—Book Fair. Pre-assembly Court.
- 9 a.m.—History of Northern Electric, *Bob Murray*. Seneca-Onondaga Rooms.

- 11 a.m.—History of the David Sarnoff Library and Resources Available to the Radio Collecting Hobby, *Dr. Alex Magoun*. Seneca-Onondaga Rooms.

Noon—Ladies Luncheon. Salon A.

- 1 p.m.—An Overview Of Television History, *Peter Yanczer*. Seneca-Onondaga Rooms
- 2:00 p.m.—Authors and Editors Get-Together. Past and prospective authors, as well as all interested members, are invited to chat with *AWA Review* Editor *Brian Belanger*, *AWA Journal* Editor *Marc Ellis*, and *Journal* Column Editors. Bring your comments and proposals! Salons B, C.

- 3-4:30 p.m.—Main Auction check-in, bidder registration.
- 4:30-6 p.m.—Auction Preview. Registration and bidding card are good for all auctions. Registration fee of \$3 Non-Refundable. No Items Containing Mercury!! Seneca-Onondaga Rooms.
- 7-10 p.m.—Old Equipment Contest—check-in of entries. Henrietta Ballroom (Salons A, B, C). This is the time to bring in displays.
- 7:30-8 p.m.—Auction Preview Continues.
- 8 p.m.—Vacuum Tube Auction. *Bruce Roloson*, auctioneer. Successful bidders must pick up tubes after the auction. Seneca-Onondaga Rooms.

FRIDAY (8-26-05)

- 8 a.m.-5 p.m.—Registration. Assembly Corridor
- 8 a.m.-5 p.m.—Book Fair. Pre-assembly Court
- 8 a.m.—Auction Preview Continues. Seneca-Onondaga Rooms.
- 8-11 a.m.—Equipment Contest Judging. Salons A, B, and C.
- 9 a.m.—Paper Collectibles Auction, *Walt Buffinton*, auctioneer. Iroquois Ballroom.
- 10 a.m. to noon—General Auction, continuing from paper-collectibles; includes communications gear and gear donated to support Museum maintenance. Auctioneer, *Walt Buffinton*.
- 11 a.m.-noon—Equipment Contest Entries open for viewing. Salon A, B, C.
- 1:00-4:30 p.m.—General Auction continues.
- 1-5 p.m.—Equipment Contest Viewing continues. Salon A, B, C.
- 3:30 p.m.—Review of Amateur Operation, *John Rollins*, W1FPZ. A chance for all hams to discuss various activities. Salon D.

7 p.m.—**AWA Top Awards Banquet.** Musical standards from the 30s and beyond presented by Ed Bolton, WA3PUN, TV personality, impressionist, and former vocalist for the Wayne King Orchestra. Cash bar available. Various AWA awards will be presented.

9-11 p.m.—**Equipment Contest Viewing** continues. Salon A, B, C.

9-10 p.m.—**Auction Payment.** Registration Area.

11 p.m.-midnight—**Equipment Contest Pickup.**

SATURDAY (8-27-05)

8 a.m.—**Book Fair.** Pre-assembly Court.

8 a.m.—**Equipment Contest Pickup.**

9 a.m.—**Golden Oldie Audio-Visual Presentation from the AWA Museum Archives.** Seneca-Onondaga Rooms

10:30 a.m.—**Pre-1912 Wireless and Electrical Apparatus,** discussion and display of items shown by members, moderated by *Lauren Peckham*. Be sure to bring an early item from your collection. Seneca-Onondaga Rooms.

Noon—**Finale Luncheon**—Luncheon with Contest Awards and Closing of the 42nd Conference. Salon A & B.

2-4 p.m.—**AWA Museum Open**

SUNDAY (8-28-05)

2-5 p.m.—**AWA Museum Open**

FLEA MARKET POLICIES

Following are the policies that will be in effect for the year 2005 Flea Market.

First, the market will run only in conjunction with the conference dates, from Wednesday morning to Saturday afternoon. No Flea Market sales will take place at the hotel parking lot prior to Wednesday. The Flea Market area will be sealed off, and patrolled until the gate opens at 6 a.m. Wednesday. The prohibition of non-conference flea marketing is a matter of hotel rules and our Special Use Permit required by the Town of Henrietta. **NO ITEMS CONTAINING MERCURY!!**

Second, there will be only one class of site. All sites are treated the same and are issued randomly on a first-come, first-sold basis. Each member may pre-register for one or two sites, at \$25 for the first and \$20 for the second. Two sites to one member will always be adjoining. Pre-registration is highly recommended to assure a pre-assigned, numbered spot on the paved area. Everyone wanting to par-

ticipate will get a spot. However, the paved-area, numbered spots will probably sell out during the pre-registration period. At that point we will start assigning numbered spots on the grass on the Thruway side of the parking lot.

Third, Flea Market headquarters will be located at the entrance to the market. Look for the big banner. This will be a full-service area where one can pay membership dues and registration fees, and sign up as a flea-market seller. Only AWA members may participate. **Everyone needs to register for the conference—the Flea Market is only a portion of overall conference activities. A non member wishing to sell in the Flea Market is welcome to join, paying \$20 dues (U.S. Members); \$25.00 dues (other countries, including Canada), \$22 conference registration (\$28 at the door), \$20 for the first site and \$35 for the second site. (Site assignments dependent on availability.)**

RULES AND CONDITIONS

EVENTS: Admittance to any activity, Flea Market included, requires a registration badge.

FLEA MARKET: Opens 6 a.m. on Wednesday. **NO ITEMS CONTAINING MERCURY.** New York State sales tax forms will be available. AWA is not responsible for sales tax. Neither AWA nor the RIT Inn and Conference Center are responsible for the security of personal property in the Flea Market area. We are asked to confine market activity to the designated area to avoid the NY State Thruway right-of-way. KOA and other campgrounds are available in the vicinity.

We have discontinued the shuttle from the various motels to the Conference location. The RIT

and the Conference Committee have devised a parking plan for Conference attendees to park at the RIT on a first come-first park basis. All parking must be in marked spaces. Vehicles illegally parked will be towed at their own expense. This is a town fire law. Permits will be distributed at registration for RIT parking.

AUCTION POLICIES

This year each member may place up to five items in each auction (the limit was formerly three items). For a complete summary of auction rules and policies, please see the back of the auction registration form you will receive at the Conference.

2005 ANNUAL CONFERENCE — EASY REFERENCE

For Tuesday evening, Aug. 23 and Sunday, Aug. 28 activities, see AWA Conference Agenda.

	WEDNESDAY AUGUST 24	THURSDAY AUGUST 25	FRIDAY AUGUST 26	SATURDAY AUGUST 27
6 a.m.	Flea market opens			
8 a.m.	Registration; Book Fair	Registration; Book Fair	Registration; Book Fair; Auction Preview	Book Fair; Equipment Contest Pickup
9 a.m.		Northern Electric	Paper Collectibles Auction	AV Presentation from Museum Archives
10 a.m.			General Auction	
10:30 a.m.				Pre-1912 Apparatus
11 a.m.	Members' Forum	History of Sarnoff Library	Equipment Contest Viewing (until noon)	
Noon		Ladies' Luncheon	Auction Stops	Finale Luncheon
1 p.m.		Television History	General Auction and Contest Viewing Continue	
2 p.m.	Short Wave Report	Authors & Editors		Museum Open until 4 p.m.
3 p.m.		Main Auction Check-in until 4:30 p.m.		
3:30 p.m.			Review of Amateur Operation	
4:00 p.m.	Key and Telegraph Seminar			
4:30 p.m.		Main Auction Preview (until 6 p.m.)		
6:30 p.m.	Bus to Museum			
7 p.m.	AWA Museum Open	Check-in For Old Equipment Contest (through 10 p.m.)	Annual Awards Banquet	
7:30 p.m.	Moonlight Restorations	Auction Preview Continues (until 8 p.m.)		
8 p.m.		Vacuum Tube Auction		
9 p.m.			Equipment Contest; Auction Payment	
11 p.m.			Equipment Contest Pickup	

THE OLD EQUIPMENT CONTEST 2005 AWA CONFERENCE

THEME: WESTERN ELECTRIC

THE THEME CATEGORIES

1. TUBES

Western Electric was an innovator in the development and manufacturing of vacuum tubes. So bring in a fine example of W.E. tube history.

2. SPEAKERS

Western Electric made many fine examples of both cone and horn speakers.

A. HORN

B. CONE

3. RADIOS and AMPLIFIERS

This is the category to enter a model 2A, 2C, 3B, 4A, 4b or any other appropriate W.E. gear.

4. BROADCAST EQUIPMENT

W.E. had a rich history in the broadcast business. They produced transmitters, Microphones, Turntables, Tone arms, Studio control boards, Station monitoring equipment... What do you have to show us?

5. COMPANY HISTORY

Enter catalogs, Literature, Manuals, Advertising, etc.

6. RELATED COMPANIES

Many other companies were related to W.E., such as Northern Electric and GrayBar. Bring in an example of equipment from these companies with supporting documentation.

7. OPEN CATEGORY

W.E., of course, was a premier manufacturer of telephone gear as well as so many other things, such as fans, motors and who knows what else. Surprise us with something unusual!

THE STANDARD RECEIVER CATEGORIES

8. PASSIVE RECEIVERS

Any detecting device, not including vacuum tubes or solid state amplifying devices, whose purpose is to

convert radio energy into intelligent signals.

9. 1920S SUPERHET RECEIVERS

Any receiver which employs the superheterodyne circuit and is from the 1920s can be entered here.

10. 1920S TUNED RF RECEIVERS

During the 20s the TRF set was one of the most widely produced designs on the market. It was sold in kit form, factory assembled or built from scratch from magazine plans. This is where you would enter a Freshman Masterpiece, AK 20, or...

11. 1920S REGENERATIVE AND REFLEXED RECEIVERS

Many manufacturers employed different circuits to improve the receiving capabilities of their radios. The regen and reflex are a few of the many circuits that were used. Bring in a fine example of this type of radio.

12. CATHEDRALS, TOMBSTONES AND CONSOLES OF THE 1930s AND 1940s

These are probably the best known styles of antique radios. Just about everyone remembers someone in his or family owning one. So bring in that Philco 90 or any other cathedral, tombstone or console radio. We will split the category if enough entries show up.

13. RADIOS IN DISGUISE

Entries here can range from an end table radio to a lamp radio. There are many different styles and variations. Some fine examples would be a Porto bar radio, Melody Cruiser ship radio, or any radio made to look like something else.

14. PORTABLE RADIOS

Any battery-operated portable radio may be entered in this category. We may split the category into decades so a transistor set does not compete with a 1920s tube set. So bring in anything from an early portable radio of the twenties to a Zenith Transoceanic from the fifties or sixties.

15. SPEAKERS

A. HORN: Any sound reproduction device can be

entered here as long as it employs a horn or bell for sound amplification.

B. CONE: When radio sets obtained greater power output levels the magnetic speaker unit was designed with large surface areas for better sound reproduction. There are many fine examples of this type of speaker. i.e. Tower Adventurer, Western Electric...

16. TEST EQUIPMENT

Many people have asked that we include this category, and it has been part of the contest for the past several years. There were many makers of test gear. A short list would include Supreme, Superior, Hickok, Weston, Read-Rite, General Radio, Simpson, Rider, RCA, and too many others to list. So surprise us! Bring in the unusual or the common.

17. TUBES

In this category you can display a single tube or a collection. There should be a common theme with the display, such as historical significance, technological breakthrough, etc. The display should tell a story.

18. TELEVISION

A. MECHANICAL: Bring in a scanning disk or a mirror screw set. It can be original or a modern replica.

B. ELECTRONIC: Enter any non-mechanical television set. Can be black-and-white or color; kit- or factory-built.

THE AMATEUR RADIO CATEGORIES

19. SPARK TRANSMITTERS AND ARTIFACTS

Do not hesitate to enter a major piece of spark equipment if you think it is rare or historically significant.

20. VACUUM TUBE TRANSMITTERS AND RECEIVERS

Some of the sets for this class are old, some not so old; most are home-built. While the predominant entries have been amateur radio oriented, commercial equipment is also welcome.

THE CRAFTSMAN CATEGORIES

21. RESTORATION OF APPEARANCE

The purpose of this category is to display examples of rebuilding and refinishing the cabinets and containers that were used to house radio receivers. There is no requirement for a particular kind or size of set to

THE CONTEST AWARDS

Elle Craftsman Given in memory of Bruce Elle to a builder of a high-quality radio receiver of an old or new type.

Matlack Transmitter Given for excellence in constructing or restoring transmitting equipment.

Ralph O. Williams Display Recognizes the informational value and quality of an exhibit in the contest at the AWA conference.

Thompson Best of Show Awarded in honor of early amateur Eunice Thompson, W1MPP, for the top entry in the Old Equipment Contest at the Annual Conference.

People's Choice Awarded to the entry that receives the most favorable votes from attendees and visitors to the contest. All entries including displays are eligible for this award.

be entered. A description of the work done will be considered an important part of the entry. The critical element is the appearance of the radio, including woodwork, escutcheons, dials, knobs and other visual details.

22. RESTORATION OF OPERATION.

This is the category for those craftsmen who artfully substitute modern components for old failures. The new electrolytic in the old can is an excellent example. Another is the transistorized tube. Perhaps the replacement of pot-metal parts by silver-gray-colored epoxy castings has been accomplished by one of us. If so, please bring in the set that incorporates that restoration. Your entry should be accompanied by documentation showing how your update preserves the quality of the original.

23. NEW OR REBUILT.

Previously we have encouraged entries that showed the conference attendees how substitutions and reconstruction's would provide vital parts or pieces. We also encouraged craftsmen who had made an old function come alive again to bring their work for review.

Do you remember the Federal receiver and the operating Marconi coherer detector that were entered in previous contests? We want to continue that tradition so bring in your retrospective designs and reconstructions. There is no requirement for particular devices or circuits.

WORLD WAR II RADIOSONDE SYSTEMS

At the outset of World War II, the need for obtaining world-wide meteorological data became imperative. Increasing military operations, especially aircraft activities, required the development of upper air profiles. Instrument packages borne aloft by free-rising balloons provided the needed data: temperature and humidity values at discrete altitude levels determined by a barometric pressure sensor.

The name "radiosonde" was adopted for all designs used in this application. Made of cardboard or plastic, the shoebox-size radiosonde container contained the meteorological sensors, a vacuum tube radio transmitter capable of radiating several hundred milliwatts of r.f. power during the ascent and a vacuum tube modulator to telemeter the sensed values of temperature and humidity at the decreasing levels of atmospheric pressure.

The radiosonde was carried aloft, to an altitude of 20 kilometers or more, by a neoprene balloon inflated with hydrogen or helium. At that altitude the balloon would burst, having expanded to a diameter of about 6-meters. It was not unusual for those within 200 miles or so from a weather station or an airport to observe radiosondes descending on parachutes.

During the war years, radiosondes were generally considered expendable after they had relayed their data to ground stations. They were designed to be lightweight and inexpensive to manufacture in quantities of many thousands.

A later development offered a means for using the same system to track the winds aloft. With known height of the balloon, azimuth and elevation angles from a radio direction finder would enable its position to be determined and the winds computed.

History of Radiosonde Development

Prior to the use of radio, free balloons filled with hydrogen or helium were tracked visually using a theodolite, which is similar to a surveyor's transit. This visual technique was unusable on overcast days and limited at night to tracking balloon-borne lanterns.

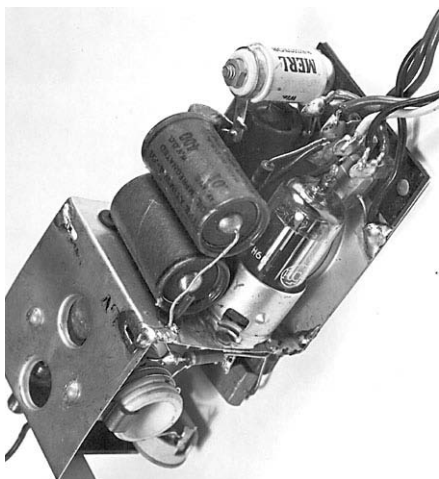
Using a radiosonde for tracking became practical when transmitters were developed that could operate at higher frequencies. Then RDF tech-

niques could be effective using reasonably-sized antenna systems at the ground station.

Once the vacuum tube oscillator was developed, it became possible to transmit radio signals from a free flying balloon. Numerous designs were tested to achieve the most accurate method of data transmission in a lightweight package. The experimentation began in earnest in about 1927. The objective was to register temperatures ranging from +40 to -90 degrees C, relative humidity from 15 to 100 %, and barometric pressure from 1040 to 40 millibars. As already noted, the winds aloft carry the balloon, so that when it has ascended to the upper atmosphere it might be at a distance of over 100 miles from the receiving antenna on the ground.

The U.S. Weather Bureau was regularly launching radiosondes prior to World War II. The most successful design was developed at the U.S. Bureau of Standards in 1937. Radiosondes of this type were available at the outset of the war.

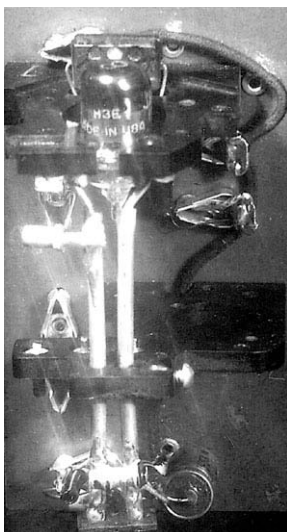
In 1942 the assigned radio frequency of the oscillator was 72.2 MHz. The antenna wire dangled below the cardboard box containing the temperature and humidity sensors, a barometric switch, and a battery pack. Variable parameters were



The T49 72.2MHz radiosonde transmitter (1943). The tube is a 3A5 dual triode.



Radiosonde balloon launch (1944). SCR658 RDF tracking antenna is in background.



The T69/AM2 403 MHz transmitter (1944) utilized a type 955 acorn tube.



The T35/AMT4 1680 MHz pencil triode transmitter (1950) with its coaxial resonator.

telemetered by utilizing the pulse rate of a separate self-blocking oscillator, modulating the RF oscillator in the range of 10 to 200 Hz.

A barometric switch alternately connected the temperature resistance sensor, humidity resistance sensor, and a fixed low and high resistance reference to the RC circuit of the self-blocking oscillator. Switching between these resistors was done at discrete pressure values by an aneroid cell moving a contact arm on the baro-switch.

A receiving station for the radiosonde system consisted of a vertical dipole antenna, superregenerative radio receiver, audio frequency meter, and a wide-chart direct-current data recorder. The function of the frequency meter was to convert the 10-200 Hz information signal to a proportional direct current output.

In 1942, improvements were made to the 72.2 MHz system at the U.S. Army Signal Engineering Laboratory at Fort Monmouth, N.J. The radiosonde transmitter, meteorological sensors and packaging were redesigned. A few manufacturers with high volume production and instrumentation experience were recruited to produce this version of the radiosonde for the military. The transmitter was designated T49.

The early receiving equipment was heavy and cumbersome, and therefore not well suited for world-wide distribution. And there were frequent reports of component failures resulting from extreme military environments. A lightweight receiver-frequency meter was designed at the Sig-

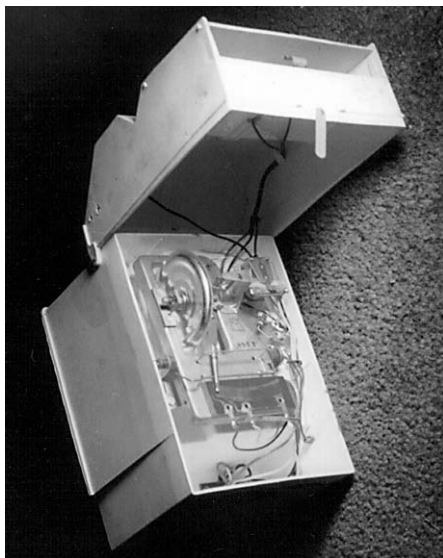
nal Corps laboratory, but the 72.2 MHz system would soon be replaced with the maturing radio technology. Thanks to the efforts of the U.S. Army Air Corps and Signal Corps, rapid transition was made to a completely new 403 MHz system design that made it possible to measure winds aloft.

The blocking oscillator frequency remained at 10 to 200 Hz, but this circuit was improved for stability by component selection. The rf oscillator was designed to use the then-popular type 955 acorn tube. A tuned circuit of distributed constants was selected, made up of short parallel lines. Interestingly, the final tuning adjustment consisted of a fine threaded screw that modified the spacing between the lines.

One drawback of the acorn tube was the requirement for a 6-volt filament supply. A version of this radiosonde was provided with small wet cells for both filament and plate voltages.

A type 1L4 tube was used in the blocking oscillator, with appropriate values of C and R to allow the time constant to relax the oscillator in the range between 10 and 200 pulses per second. The rf carrier was frequency modulated at the pulse rate simply by combining the plate supply for both oscillators through a common resistor.

A completely new ground station design was based on a high-gain dipole antenna array that was mounted on a pedestal that could be hand-steered for azimuth and elevation. Rather than depending on pointing the antenna for maximum signal re-



Radiosonde baro-switch MD210/AMT4 (1950).

sponse from the rounded end of a pencil beam, a phasing switch displaced the beam several degrees to assist tracking, on a scope, by showing two amplitudes for azimuth and another two for elevation. By steering the antenna array until equal signals were obtained from the displaced lobes, a more exact angle was obtained. This very successful 403 MHz receiving system, labeled SCR 658, utilized a superheterodyne circuit.

Because of the fast-paced electronic developments during World War II, the radiosonde system would soon be improved again. The position fixes provided by the SCR 658 design became less accurate as the balloon flight progressed and the elevation angles became lower. Further, the manual tracking system was tedious and subject to operator error.

The use of microwave technology would make feasible an automatic tracking radio theodolite (radio direction finder). A parabolic antenna would yield improved signal gain and a sharper beam pattern. The strategy required the development of a radiosonde transmitter with an oscillator capable of several hundred milliwatts output at a microwave frequency. Its weight and cost had to be appropriate for an expendable device.

The concept became reality only after the conclusion of hostilities. A carrier frequency of 1680 MHz was assigned to the system. Key to the oscillator design was the use of an assembly including an RCA "pencil triode" surrounded by a tuned coaxial resonator. The assembly was designated RCA type 5794. A half-wave antenna, the mi-

crowave oscillator, and the blocking oscillator circuitry were mounted on a pc board, all enclosed in a plastic bottle.

Unlike the former system (AMT-2), the oscillator was amplitude modulated by the blocking oscillator pulses. This new radiosonde was designated AMT-4.

A key element of the ground system for the microwave radiosonde was its parabolic antenna. To further sharpen the direction finding response, a motorized method of lobe scanning provided precise angles. The beam pattern was rotated a few degrees at 30 rpm permitting comparison of signal amplitude from the sides of the lobe pattern. The carrier signals derived were used to automatically steer the dish and provide recorded azimuth and elevation angles throughout the radiosonde balloon flight. This advanced tracking system was labeled ANI/GMD-1. Its use extended into the era of the U. S space program.

Several other types of radiosondes were developed for special purposes. One such design was for situations where it was not possible to use a ground station. This model was dropped from an aircraft and descended by parachute while the meteorological data, transmitted by Morse code, was recorded in the aircraft. The signal from a crystal-controlled oscillator was received on the short wave band of the military aircraft radio.

Meteorological radiosonde development from 1942 to 1945 reflected the rapid growth in the engineering science of electronic components, circuits, and systems. The resultant technology provided operational equipments for essential wartime weather forecasts and enhanced air flight capability. Developments continued after World War II and the improved gear has been in use for years up to the present. ■

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THE VACUUM TUBE

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Some RCA Discoveries

RCA's internal *Standardizing Notices* naturally give a lot of insight into their tube-manufacturing operations. Here's a miscellany of topics recently developed from them. (RCA *Standardizing Notices*, which were essentially factory standards for tube manufacture, testing, and labeling, are contained in the Dowd-RCA Archive, a holding of the AWA Museum.)

"Tests N.O.S."

The auction site eBay is a great source of light entertainment, small frauds, and occasional tube bargains. Lately, postings have been appearing lately in which a seller claims that a tube "tests New Old Stock," or even "tests better than NOS."

This is something of a stretch. We'll start by assuming that the seller has a reliably calibrated tester (hardly a sure thing). Let's also presume that the determination of "NOSness" is based the tube's transconductance (G_m , the accepted "best" measure of quality). Yet there is generous room for error.

The basic flaw is assuming that there is some magic value of transconductance that defines newness. Here are RCA's limits for G_m on three popular tubes, given in millisiemens (mS) for compactness:

Type	Bogie	Factory Range	Customer Range
2A3	4.0	3.45-4.55	3.2-4.8
6L6GC	6.0	5.55-6.45	5.4-6.6
12AX7	1.6	1.3-2.0	1.25-2.05

These limits come from *Standardizing Notices* in the "23-1" area on test practices. The "factory" limits define what RCA would ship as a "good" tube. The "customer" limits presumably provide an allowance for distortion of tube elements during shipping, or similar mild variance. The customer limits for the 2A3, 6L6GC, and 12AX7 are respectively "20%", "10%", and "22%" of the nominal or bogie value. An "NOS" tube should test within this range...if the tester applies the same voltages as RCA's production test sets used.

So what is the meaning of a value of, say, 4.6

mS measured on a 2A3? Is this an unusually "hot" tube by pure luck? Or did someone drop it, moving the grid dangerously closer to the filament but thereby raising the G_m ? If the reading is only 3.5 mS, is this a not-very-good new tube, or an old one whose performance has slumped to this figure after a few hundred hours of use?

The matter of "same voltages" mentioned above is important. RCA tested the 2A3 at 300 V on the plate and -60 V on the grid, yielding the nominal 4.0 mS. Sometimes one can't even get consistent results looking the tube up in a manual: RCA's example of "typical operation" for the 2A3, given in the HB-3 handbook, is 250 V and -45 V respectively, giving a much higher G_m of 5.25 mS. Testers apply all sorts of voltages. Your results may vary.

In any event, the appellation "NOS" should be reserved for those tubes that can reliably traced to left-over stock. Trying to define "NOS" electrically is perilous business.

The "Special Black" 6SJ7

RCA made a line of "Special Red" premium tubes, as celebrated in Bro. Patrick Dowd's article in the May 2000 issue. The line included the 5693, a version of the venerable 6SJ7 metal-shell pentode with "ruggedized" construction.

Sales of metal tubes faded during the '50s. RCA must've found it desirable to meet the residual demand for 6SJ7s by other means: S. N. 27-1-1A, page 13-RM2, on practices for marking tubes, was reissued in May 1961 to declare that "Type 6SJ7 is a 5693 tested to 6SJ7 specifications." So buyers of late-vintage 6SJ7s may have gotten a much better made tube than they expected!

Private-Brand Markings

Tubemakers routinely put custom brand names on tubes for major customers; only rarely did the tubes in a new radio or TV set carry the tube company's name. RCA's custom-brand list contained about 275 names of equipment manufacturers: Admiral, Argus, Aircastle...through Wizard, Wurlitzer, and Zenith. Large end-users of tubes also had private brands, like ADT, IBM,

the FAA, and Western Union. Foreign tube vendors like Mullard and Philips got private branding on RCA product too. Likewise with the Government of Iran and the China National Aviation Corporation. (Just imagine American receiving tubes being exported to Asia today!)

The S. N.s on marking and shipping of these tubes contain a lot of miscellaneous but insightful details on the customers, their private-branding habits, and even where their products were made. Here are some examples.

Tubes branded for Hallicrafters normally went to the company's factory in Chicago, but also to the Esquire Radio Corporation in Brooklyn. This is consistent with reports that some later and cheaper Hallicrafters radios were made "outside."

Tubes for RME (Radio Manufacturing Engineers) as of 1960 went to the RME location at Washington, IL, but also to Minitron Inc. (Escondido, CA) and Electrolab Printed Circuits (Encinitas, CA).

"Admiral" tubes were shipped mostly to the company's two plants, but 2AF4s and other TV-tuner types branded "Admiral" went to the tuner manufacturers (Oak Mfg., Sarkes Tarzian, and Standard Kollsman).

"Sherwood" tubes, presumably for Sherwood hi-fi gear, were supplied to the El-Rad Manufacturing Co. of Chicago.

"Silvertone" devices went to about 15 companies, including Arvin, Esquire, and Hallicrafters. "Wards Airline" tubes were delivered to nine manufacturers, among them Don McGohan Inc. (Chicago), Esquire, Muntz Television Inc. (Wheeling, IL), and Westinghouse (Metuchen, NJ).

The typical E. H. Scott "Quaranta" radio isn't fully restored without a set of "Scott Radio Labs" tubes.

"CMI" tubes (Chicago Musical Industries) were shipped to Wells-Gardner, Lowrey Electronics, and Hallicrafters (all in Chicago). Hallicrafters also received some tubes with the Raytheon brand, back when the latter was in the ship-to-shore and CB radio markets.

Tubes marked "FoMoCo" and destined for a maker of radios for Ford cars carried a letter to designate the purchaser: B - Bendix, D - Detrola, F - Ford itself, M - Motorola, P - Philco, S - Stromberg-Carlson, or Z - Zenith.

The following was a bit of a surprise: RCA-made tubes branded "Telefunken" were bought by, as of 1966, the Curtis Mathes TV plant in Benton, AR. This claim is strengthened by external evidence: look up the Telefunken "1969 Explorer" model in the Sams Photofact index, and one finds a "similar to chassis" reference to

Folder 733, Set 1 - which covers the Curtis Mathes TV-17. So we may find "Telefunken" tubes made not in Germany but New Jersey!

If "Telefunken" isn't sacred, we can try "Western Electric." RCA private-branded a tube coded KS-10074 for them.

Customers specified the colors of ink used in applying the brands: white, black, light blue, Chinese red, Castilian red, orange, "GE orange," turquoise, silver. The inks generally came from Markem, the main maker of stamping machines.

Colors could be an involved matter. For Westinghouse, 450-mA tubes like the 4AU6 were branded in Lawn Green, while 600-mA types like the 3AU6 were Golden Yellow. For DuMont-Emerson tubes, the ink was Willow Green...except for 6BA6s and tubes for color TV, which were orange...but then the 450-mA TV tubes were branded in white. Zenith had its own scheme: nuvistors were branded in black. However, tubes for Zenith Parts Sales were in red, devices for the Springfield, MO plant were marked in white, and tubes for all other locations were in Golden Yellow.

Date codes on tubes are a slippery business: the "date" (week or quarter) being indicated can refer to the date of manufacture, of shipment from the warehouse, or of warranty expiration. The date code on RCA private-branded products indicates the time of shipment.

We can usually tell what maker produced a private-branded tube from a three-digit code on the item: "188" for GE, "274" for RCA, "312" for Sylvania, etc. The Electronic Industries Association originally termed this a "source code." However, to handle the special case where, say, RCA might buy-in Philips tubes for resale to, perhaps, Rauland, the "source code" was redefined in the '60s as a "sponsor code" indicating RCA as the sponsor of the sale. To identify such tubes, RCA added a dot after the four-digit shipping-date. So, in their example, a tube branded "Hammond" might be coded "5922C 274." Absence of the dot meant an RCA-made device.

The equipment makers got their tubes in bulk packs, but for the replacement-parts market RCA would pack the tubes individually in the customer's boxes, for example those of Delco or Lafayette. GE did the same, as exemplified by a 21LU8 Compactron, almost certainly of their manufacture (it carries the GE multi-dot marking). It has the AmpereX logo and sale-sponsor code "111." It's in a regular AmpereX green-and-yellow carton, but the box has a form number "KR-79484 AMP." "KR" form numbers are routine on products of the GE plant at Owensboro,

(continued on page 48)

A STRUCTURED APPROACH TO FIXING UP THOSE NICE OLD RADIOS

Repairing a 1940 Howard Model 437

A few months ago our guest columnist, Jim Hanlon, discussed the Howard Radio Company Model 438 communications receiver. At that time I remembered having a couple of Howards in storage, and thought at the time that one of these would make a fine companion article for the 438. It turned out that I had a Model 437, and I attempted to fix it up in time to have a companion article to the one by Jim. As it turned out, the work was far more extensive than originally thought, and summer intervened. But the job is now done, and can be reported.

The Howard Company of Chicago, in addition to their other product lines and the sets built for other manufacturers such as Hallicrafters, offered a line of communications receivers between 1938 to 1942. During the latter year, they converted to wartime production for the armed forces. For example, they manufactured BC-348 aircraft receivers and BC-779 Super Pros.

Though the Howard name was advertised in the 1946 *ARRL Handbook*, it is doubtful that the firm manufactured any receivers after the war. The Moore book (1) lists some 12 different Howard receivers from the 1930s and early 1940s.

There were some unique design features in the pre-war Howard line, including a progressive

1930s art-deco appearance. The shroud-type cabinet fitted down over the chassis, which in turn fastened to a base plate. The chassis wouldn't fit into the cabinet without the base; all the pieces were needed to make the unit complete.

This particular four-band set had nine tubes, including an RF, two IFs, and a noise limiter. Coverage was 540 kHz to 43 MHz. The speaker was internal, but an external speaker could be used. There was a crystal filter at the IF frequency of 465 kHz, and provisions were made for a carrier level meter unit which was available as an extra. The *Rider's* reference is Volume 12, and for a good overview of the line, the reader can access the N7RK home page at <http://members.cox.net/n7rk>.

This particular receiver didn't look too bad externally, except for the dial. There was extensive corrosion where the plating had worn off, giving it a definite "scroungy" appearance. This fault is common with Howards, and is probably the result of a too-thin copper plating during manufacture combined with long-term in a damp area. The copper-plated chassis was also subject to rust.

Unfortunately there is no way I know of restoring these dials to their original appearance short of remanufacturing them. And considering the value of even a pristine Howard, it is hardly worth the effort. (Perhaps a reader can contribute some thoughts here.)

As I surveyed the work to be done, it rapidly became apparent that I had a real chore ahead of me. A previous owner had removed the 6SQ7 AVC/detector/first audio and substituted a miniature tube in some unknown circuit, which included the 6H6 noise limiter. Besides restoring the original tube lineup, the usual assortment of old 1930s capacitors and resistors would need to be checked and replaced where needed.

While some radios can be repaired and even restored without the original circuit diagram, this was



My Howard 437.

These would have to be either reformed or replaced. In this radio there were five, and they were all bad. There were numerous other resistors and capacitors to replace, including some that had been installed by a previous owner.

The various controls were cleaned and lubricated, and the string drives for the two tuning capacitors were checked. We have gone through these procedures in previous columns in this series.

After checking the B+ circuits with an ohmmeter to be sure that there was no apparent short, I plugged the line cord into the bench Variac and gradually brought the voltage up to 100 VAC.

The first problem that surfaced was an intermittent 80 rectifier. Next, while the B+ line showed the expected 250VDC, the set was strangely quiet; i.e., no signals at all. The usual procedure here is to check the various tubes for screen and plate voltages, and sure enough, there was no voltage on the RF and IF screens. The diagram showed that a 10,000-ohm dropping resistor from the B+ line was absent, and once that was installed, the set came to life.

One interesting development was the discovery that the antenna coils on two of the four bands were open, and one of them showed burn marks. Coils can be repaired or rewound, but they have to be removed from the radio first, and in this design the only way to get at the two coils was to disconnect all the leads to the switch/coil assembly and remove it completely, a very large job.

Another possible fix is to simply connect a 0.001 or a 0.0001 mF capacitor across the paired switch contacts, thus connecting the antenna directly to the tuned input grid of the RF tube. For some reason one of the two bad coils exhibited enough coupling to the secondary winding for the band to work. Signals were received.

At this point the work was stopped due to publishing deadlines, but it is obvious that a great deal more needed to be done to make this into a useable communications receiver. In the cosmetic department, the old original celluloid covering the dial plate is yellowed and quite fragile, and should be replaced. A total alignment needs to be done,

and that takes a minimum of two hours.

There is audio distortion, due either to the elderly hot-field speaker or to some bad component in the circuit. One antenna coil appears burned out and needs to be repaired. The fact that there is no practical way to improve the appearance of the dial is the main deterrent to doing more work on this set. It has had its original circuit restored, it now works, and I will probably leave it at that. If I do decide to spend more time on this radio, the results will be reported.

Howard sets are somewhat different from the usual offerings of the depression years. Though the -437 has an interesting appearance, both the chassis and cabinet are made of light-weight metal. The circuit does appear to be adequate and has some nice features.

However, the BFO uses a moveable slug instead of a decent tuning capacitor, which is a cheapening feature. The bandspread readout is arbitrary, and a frequency/dial reading chart would have to be prepared by the user, not an easy task for a 1930s amateur.

But then, what 1930s amateur worried about his frequency? he tuned to a signal and answered it with his transmitter somewhere in the general neighborhood, depending on his stock of crystals. VFOs were beginning to come on the market (the Meissner Signal Shifter is one example), and also could be built from articles in *The ARRL Handbook*.

There is another Howard receiver on the shelf awaiting restoration/repair, a Model 440. But it may be a while. The next project, hopefully for the next *Journal*, will be the mystery airport receiver described in my "The Communication Receiver" column elsewhere in this issue. ☐

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KY, the "KR" being a hangover from the days when the plant belonged to Ken-Rad.

De-Etching Tubes

It was occasionally necessary to remove the type-number "etch" (a flame-baked ink) from a tube. RCA's standard process (S. N. 27-1-1A, P. 4-2) was to soak the bulb, upside down, in am-

monium bifluoride solution for two minutes. After rinsing, any residual etch was removed with a buffing wheel and abrasive compound.

A process like this was called-for when RCA needed to, say, fill an order for 6DC6s by specially testing 6CB6s in stock and re-marking. In this case the new "etch" was sand-blasted through a rubber stencil. ☐

KEY AND TELEGRAPH

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George W. Conkling: Champion Telegrapher

The Conkling Key is one of the rarest semi-automatic transmitters. As of this writing, only one is known to exist in a collection. The key was sold and promoted by George Conkling, who was better known as a champion telegrapher than for his connection with this rare key. Conkling was considered to be one of the best all-around telegraphers in the United States as well as a sender of the most beautiful sounding Morse.

Conkling was born in Mountaindale, New York, in 1871, and like many telegraphers in the late 19th century learned his skills at a very young age. He was first employed, at age 15, on the West Shore Railroad in New Jersey, then worked on several other railroads during his teenage years.

In 1890 Conkling started with the Postal Telegraph Company at 187 Broadway in New York City. He soon became known as an extremely fast operator with the key and as a pen receiver. Postal made him one of a "fast quartette" on their Boston quadruplex circuit. A "quartette" consisted of four telegraphers on each end of a circuit that was capable of handling four simultaneous transmissions—two operators transmitting and two operators receiving.

Telegraphers with his abilities easily found higher pay on press and financial wires. Conkling worked for The United Press until it went bankrupt in 1897 then, in 1898, started working for The Associated Press, *The New York Journal* and various brokerage houses in New York's financial district. He became a master at using the typewriter and the Phillips code, which was the standard telegrapher's short hand frequently used in press reports.

Conkling also worked one of the heaviest press circuits out of New York, the leased wire of the Chicago newspaper, *Inter-Ocean* where

he would routinely send 20,000 to 22,000 words of press material each night. He became nationally recognized as an expert telegrapher when he won the Morse sending competition at the Grand National Telegraph Tournament held at Madison Square Garden in May of 1898. The telegrapher won the competition by sending a blistering

345 words in 5 minutes defeating his nearest competitor by nearly 15 words per minute.

Conkling's prominence on the national scene made him highly sought after not only for his ability to send messages but for his publicity value. New start-up telegraph transmitter companies often looked for the endorsement of well known telegraphers.

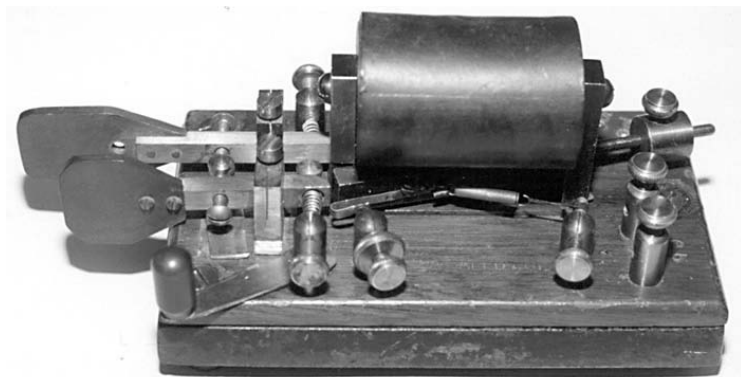
In 1902, he became associated with inventor Charles Yetman and began giving instruction to telegraphers on Yetman's typewriter transmitter. One could send perfect machine-like Morse by typing on the Yetman keyboard.

The following year, Conkling became the general manager of sales for the newly formed Yetman Transmitting Typewriter Company. He also remained active as a telegrapher, working at various times with the Laffan News Bureau, *The New York Herald* and in the financial district. In 1903, he was honored as the best sender of the Phillips Code in the country by winning the event at the Philadelphia Telegraph Tournament. He sent 1000 words of Phillips code in 15 minutes, 55 seconds. He also received a silver cup for being the "most perfect Morse Sender," the first time the award was given in telegraphic history.

In the spring of 1906, Conkling was recruited by well-known inventor and former telegrapher, Patrick Delany to become the general manager of the new Delany Telegraphic Transmitter Company. Delany was the inventor of a wide



George W. Conkling.



range of wire and wireless telegraph inventions, including both semi- and fully-automatic transmitters. With Conkling as his G.M., Delany now had the best sender in the country endorsing his transmitters. Delany's transmitter inventions included both mechanical and electro-mechanical models and are best known today as the "Auto-Dots."

Conkling went on the road at various times promoting Delany's transmitters. He was at the Railway Telegraph Superintendents Convention held in Denver, Colorado in June of 1906, where he manned a booth for the Delany Telegraphic Transmitter Company. The only other transmitter manufacturer at this convention was the Mecograph Company, represented by William Coffe.

At the International Telegraph Tournament held that same summer in Boston, Conkling occupied a suite of rooms at the Quincy House, where he demonstrated Delany's transmitters. He was invited by the tournament committee to send his near perfect Morse for both the straight Morse and Phillips Code receiving competitions.

There were so many telegraphers lined-up wanting to have a the opportunity to receive Conkling's Morse that he had to send 350 words of straight press and 500 words of Phillips Code twice to two different groups of entries. A difference of only a few seconds was recorded between the pairs of messages sent by Conkling, attesting to the precision of his sending.

Tournaments limited participants in the sending competitions to manual keys in spite of protests



Two views of the Conkling Key.

by several transmitter manufacturers. The manufacturers had argued that neither Postal or Western Union limited their telegraphers to hand sending in actual service. So Conkling was not allowed to use a Delany transmitter in the Boston sending competitions. Instead he used a manual straight key invented by Samuel Lefley, which had a triple knife blade hinge with no trunnion screws and utilized a rear contact.

The Conkling Key was sold and advertised separately from the Auto-Dots by George Conkling in 1908 during the time he was Delany's G.M. The address given was the same as that listed for him in the Delany Tel. Transmitter Co. ads that year. Those familiar with the Delany Auto-Dots instruments will see basic similarities to The Conkling Key. They all used brass parts mounted on a wooden base with a heavy metal sub base.

Even though the instrument was advertised as "The Conkling Key," neither Conkling's name or the familiar four-leaf clover logo of the Delany Tel Trans. Co. appear on it. The extent of Conkling's influence in this key design is unclear. The Key is stamped "Pat. Applied For,"

but a search showed no patents issued to George Conkling for any invention. The patent was granted to his brother, De Witt Conkling, and F.W. Smith of New York.

Conkling's ads for this key stated that it was "a battery transmitter without a battery." This meant that its single electromagnet was driven by line current instead of using a local battery. The key utilized a unique system for generating dots.

Its pendulum is a $2\frac{1}{2}$ " $\times$ $\frac{1}{4}$ " $\times$ $\frac{1}{4}$ " armature pivoted in the center and located underneath the magnet. It has a rod extending at one end with a movable speed weight. The armature extends diagonally to the outward sides of the vertical poles of the magnet and is held against them by the "dot arm."

When an operator moves the dot arm to the left, it first frees the armature allowing the spring tension on the opposite side to pull the armature to the dot contact. Secondly, it completes the circuit energizing the magnet which attracts the armature back, causing it to go into oscillation as a result of the two opposing forces. A combination of four items influence the generation and speed of the dots: 1. The amount of current passing through the magnet's coil. 2. The amount of spring tension. 3. The location of the speed weight. 4. The gap of the dot contacts. It was claimed that this key would work on any circuit regardless of length. Conkling clearly had experience with long circuits. He regularly worked the longest circuit in the world, the E.F. Hutton & Co. leased wire from New York to San Francisco with loops to San Diego and Seattle. It totaled nearly 5800 miles in length. To make the key adaptable to different line lengths and conditions, a rheostat made of "coils" of fine German silver serves as a selectable shunt across the magnet's coil.

The idea of a line-driven key with a rheostat will probably remind some of the Electro-Bug which came out in the late 1920s. The Electro-Bug is a more efficient design using a conventional vibrating pendulum and a magnet that is energized only when the dot contact is "hit." With the Conkling key, the magnet is energized for the entire time the dot lever is held to the left. As mentioned, dot generation in the Conkling design is a complicated process, depending on the interaction of four different factors.

The Conkling key shown is missing a Delaney invention called an "anti-interference pin." This device was screwed into the open hole of the dot knob and reached over towards the dash knob. It prevented either the dot or dash levers from making a premature false contact until the opposite

lever was completely withdrawn.

The reason for the rarity of the Conkling key is unclear. The \$10.00 price tag was certainly competitive with the other mechanical semi-automatic transmitters being sold at that time. Perhaps its line-powered design was its weakness, though the key may have worked fine on different circuits when conditions were good. Unlike telegraphers who used electro-mechanical designs that were powered by a stable local battery, an operator of a Conkling had to chase fluctuating line currents in poor conditions to maintain the oscillation of the armature. .

George Conkling's life was tragically cut short. He was killed in a car accident in Ridgefield Park, New Jersey in 1917 at the age of 45. At the time of his death he was still working as a telegrapher but he was also in business with his son operating Conkling's Garage in Ridgefield Park. The accident occurred while he was demonstrating his brand new Velie automobile.

A few months before his death, the closing prices of the New York Stock Exchange, as sent by Conkling, were recorded on a Phillips receiving instrument. The Morse from the machine's embossed tape was transferred to phonograph records so that telegraphers could sample his near-perfect work. Conkling was known to his friends as being a true gentleman, but to the national telegraph fraternity he was also remembered not for the products he promoted or the key bearing his name but for being simply an all-around champion telegrapher.

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Thanks to Gil Schlehman K9WDY for allowing me to examine and photograph his Conkling Key at Dayton, OH., May 20, 2005.

MICS AND MEN

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Note: George Freeman graciously gave up his spot in the April issue to help us solve a production problem. So in this issue we present a double header—with the column that was to have appeared in April just below and the July column following—mfe.

The Man: B. Mitch Reed The Mic: Electro-Voice Model 655

Few disc jockeys can claim to have achieved fame in widely separated parts of the country. Dick Biondi is one of them. He and I worked as DJs in 1955 at "Hot Radio," WHOT, in Youngstown, Ohio. Later, Dick was not only successful in Chicago at WLS and WCFL, but was also "big time" at KRLA in Los Angeles.

Ron Landry achieved fame on both the east and west coasts. We worked together mornings at WDRC in Hartford, Connecticut. Ron repeated his success at WBZ in Boston and then went on to LA, where he teamed up with Bob Hudson to form the legendary KFI comedy team of Hudson and Landry. Ron also was a writer for such hit TV shows as "Sanford and Son."

Perhaps the most successful east and west coast disc jockey was B. Mitchell Reed. Known also as B.M.R. and "The Beemer," he navigated from jazz to Top 40, to Progressive Rock formats. Reed was at his east coast zenith on WMCA, New York and again at the top on the west coast at KFWB.

During the early days of rock, a rapid-fire delivery was deemed necessary to maintain pace and excitement. Reed excelled at both. "I'm not talking too fast," he'd say, "You're listening too slow (1)." In 1958 KFWB identified itself as "Color Radio." The station moved to a 45 percent share of the market in three months. The Los Angeles station with the next highest rating could muster only a nine percent

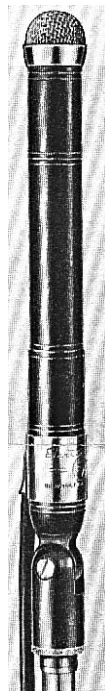
share (2).

My Electro-Voice Model 655, the Slim-Trim TV Dynamic (3) was advertised as being "particularly useful for TV staging" because of its slender design. It is 11½" long, including swivel mount, and only a tad over an inch in diameter at the rings. "The capacity of the magnetic circuit is equivalent to that of microphones having heads four times as large. The baton design is useful for 'pass around' in audience participation and man-in-the-street shows."

The 1954 Model 655 is a "dynamic type, non-directional microphone...with a pop-proof grille acoustically treated to stop wind and breath blasts." Frequency response is 40 to 15,000 cps. My 655 case is "black Alumalite with optional satin chrome trim." I was fortunate to find it in the original maroon and tan box with Cannon XL-3 cable connector, data sheet, guarantee papers and a wrench. It had never been sold by the factory authorized retailer. At the time of manufacture E-V's plant was located in Buchanan, MI.

REFERENCES

- (1) Passman, A. *The DeeJays*, The Macmillan Co., New York, NY, p. 230
- (2) Fong-Torres, B., *The Hits Just Keep on Coming*, Miller Freeman Books, San Francisco, CA, p. 125.
- (3) E-V condensed catalog #113.



The Electro-Voice Model 655.



B. Mitchell Reed

The Mic: CFRB's Combination Microphone

The Men: John Sharpe, Ted Rogers

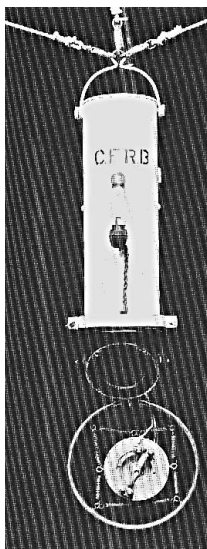
Microphone technology was in its infancy in the 1930s, and there were reliability problems. Sometimes these were the result of talent abuse. The over-emotional soprano swings her hand, the dramatic actor raises his arm to emote, the violinist lets his bow go in the wrong direction—and pity the microphone. You may have seen pictures showing railings installed around mic floor stands to keep the talent at bay.

But sometimes the problem was a result of the microphone's design—such as perennial difficulty with particle bunching in carbon mics.

A Canadian broadcast engineer came up with a solution: the “CFRB Combination Microphone,” introduced in January, 1930. The device had a condenser mic on the top and a carbon mic on the bottom! If one of them failed, the engineer pressed a button and activated the other one. The carbon mic, least reliable and least valuable, was mounted on the bottom, which was the more vulnerable location.

The designer of this combination microphone was studio engineer John Sharpe. Sharpe developed two other studio innovations at station CFRB: “The Microphone Swing Arm,” a mic on a huge boom like Hollywood film studio units of today, and “the Orchestral Audition Cabinet,” which isolated the conductor from his orchestra, enabling him to hear sound levels and balance as they were going out over the air. This isolation technique has been used for years in recording studios.

Such innovations would have appealed to the owner/operator of the radio station, Edward



Clockwise: John Sharpe, postage stamp commemorating Rogers' batteryless radio, the CFRB Combination Microphone

“Ted” Samuel Rogers. Rogers introduced the first operational AC radio tube, the Type 32, after he improved upon the Frederick S. McCulloch design. The tube was on the Canadian market in 1925, a year before a similar one would appear in the United States.

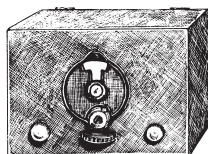
That same year Ted Rogers created the world's first a.c. radio, again beating a similar U.S. product introduction by a year. It was called the Rogers Model 120, the first in a series of “Rogers Batteryless Radios.” Emulating the first licensed radio station, CFCF (“Canada's First, Canada's Finest”) in Montreal, owned and operated by Marconi Wireless. The CFRB call letters were also intending to be an acronym—standing for “Canada's First, Rogers Batteryless.”

Just in case the message of the call letters was too subtle, station listeners were treated to featuring “Rogers Versatile Symphony Orchestra” and “Rogers String Symphony.” Later, after a merger with Majestic, the station also carried *The Majestic Theater of the Air*.

Rogers died in 1939 at age 38. His son, Ted Rogers, and the daughter-in-law Ted never knew, donated \$26 million to The University of Toronto, alma mater of both father and son, on what would have been the father's 100th birthday in 2000. ☐

AMATEUR RADIO

EDITED BY **JOHN F. ROLLINS, W1FPZ**, HC 33, BOX 150, ARROWSIC, MAINE 04530
PLEASE INCLUDE SASE FOR REPLY.



Results of the January 2005 Linc Cundall Memorial OT Contest

The 2005 Linc Cundall Memorial Contest was held during the last week of January, 26th and 27th and again the 29th and 30th. Conditions seemed to be fairly good over most of the period and member participation picked up slightly. We also had five new participants; welcome all!

Activity in the 160 meter band was confined just to the first period (Jan. 26-Jan. 27). Scoring was also changed for 160 meter contacts with a view toward generating more interest in the band; a three point multiple was given for each contact, and if you were lucky enough, an additional two points for E to W or W to E contacts. Not too many participants worked 160 meters but those that did racked up a lot of extra points for their effort. Perhaps next year more participants will take advantage of 160.

For the overall scoring, longtime contesteer and builder Bob Raide, W2ZM swept the field with an incredible score of 1235 points! Bob seemed to be on all bands all the time! Second place in the total scoring was Larry Rosine, W0OG with 711 points, another great score!

On the DX side, Sven, SM4DIG in Sweden reported that he heard lots of stateside calls but could raise only 7 stations. Puzzling, and the only explanation seems to be that contestants here just weren't expecting an SM4 member calling.

Also many of the AWA members were not set up to operate on 20 meters. Here in my QTH he was a 559! Larry, W0OG copied 539 at his QTH in Kansas, and Harold, KB0ROB copied 559 in Minnesota. Bob, W2ZM copied 559. These QSOs were all on 20 meters. Better luck next year!

Finally I would like to include a note that longtime AWA member and contestant "Bud," K2LP sent to me with his log: "I really enjoyed the Linc Cundall event as I could once again watch the four 866 rectifiers flashing and see the 860 final tetrode get pink with the keying. It brings it all back to those good old days of the thirties when all our rigs were home-made and pieced together from scrounged up parts."

For me that says it all. Thanks, "Bud." So 73 to all and I hope to hear you all on the next test. Thanks for the nice notes and fabulous pictures of old time rigs.

Top Ten QSOs

CALL	TOTAL	CALL	TOTAL
W2ZM	1235	KB0ROB	342
W0OG	711	N8YE	258
K9VKY	387	NE1S	240
W2VDX	356	W2AO	234
AI2Q	343	K1FI	216

Complete Participant List

CALL	TRANSMITTER	160	QSO's/BAND		20	TOTAL POINTS
			80	40		
W-1						
NV1X	'62 DX60		7	1		36
W1NZR	'43 BC696	1	9	5		92
W1DDW	'29 MOPA, MOD		3	4	5	37
NE1S	'29 HART., '37 OSC,	2	12	6	1	240
W1FPZ	'34 47-10-860,'29 CLPTTS		16	8	3	192
W1ZB	'40 HB 6L6-809		13	11		156
W1GIG	'39 MEISSNER		1			6
W1YT	'40 6L6 XTAL OSC		3	14		108
KC1FB	'28 MOPA, '35 OSC		7	3		80
K1GDH	'40 XTAL OSC		19			171
NS1W	'42 TCS		6			36
K1FI	'46 COLLINS 32V		11	9	4	216

CALL	TRANSMITTER	QSO's/BAND				TOTAL POINTS
		160	80	40	20	
W-2						
W2AO	'38 6L6 XTAL		20	6		234
KB2PLW	MOD		2			4
K2LP	'38 HB 860		44			144
W2ZM	'29 HARTLEY, MOPA	7	44	30	6	1235
W2CQH	MOD		9	2	5	38
N2JPR	'45 MEISSNER		9	1	1	144
W2VDX	'39 HB FINAL 807	3	20	11		356
W2LID	MOD		15	6		46
N2VO	MOD		7			14
AI2Q	'39 6L6 OSO		23	12	3	343
K2KK	'37 XTAL-6V6-6L6			9		48
KE20	MOD		5	2		14
W-3						
N3DQU	'38 MEISSNER		3			27
W3HWT	'32 HB OSC-BUF-AMP	2				54
K3DZ	'39 XTAL OSC		5	1		72
W3CNS	'43 MEISSNER	1		8		66
W3VVS	MOD		6	2		16
W-4						
AA4RM	'43 NAVY-TCS		8	5		66
W4VBX	MOD			2		6
K4JYS	'29 TNT		16			128
K4LJH	MOD		6	5		11
W-5						
K5RB	'29 MOPA, 37-6L6-809	1	2	3		50
K5CF	MOD		4	1		14
W-6						
W6TOP	MOD		1	1	1	8
W-7						
W7LNG	'29 PP45S, 25 HARTLEY		2	3		30
W7DRA	MOD		1			4
W-8						
N8YE	'40 NAVY TCS		19	17		258
WD8UFB	'39 6L6 XTAL			2		12
K8NI	MOD			5		8
W8KGT	'42 BC 459, CBY, MILLEN		8	10		198
W8IVF	MOD		4	1		32
W-9						
AA9DH	'38 HARTLEY		6	2		144
W9KV	MOD		3			15
N9TT	'41 BC-375	2	19	4	1	108
K9VKY	'44 AN-PRC-1, '40 OSC		19	19		387
W-0						
W0VLZ	'38 THORD 100		9			90
W0OG	'40 HT6	4	20	14	4	711
KB0ROB	'34 HB, 29 MOPA		15	14	3	342
VE						
VA3AWA	'38 QSL-40		4			24
VA3HN	MOD		8	5		52
DX						
SM4DIG	MOD				7	42
KP2/K8NI	MOD				9	9

2005 O.T. DX Contest Results

By Randy Haus KB2PLW

A “big gun” contest gives us a run for our money!

A total of thirty AWA stations sent in logs, along with many good comments and photos. Unfortunately, there was a “big gun” contest going on in the bands that we like to use, with the attendant wall to wall super high speed “QRZ de ...”, being sent over and over. From the looks of the logs, we did a great job persevering and working through the QRM.

Due to job requirements, I was able to get on the air for only about four hours and, alas, did not make any contacts. Some of you sent in apologies with your low score but rest assured, I’m living proof that there is always someone who did worse!

Fifties era gear and homebrew circuits continue to be the mainstay of the event, although Richard, W7VS sent in a beautiful photo of a 1927 Hartley/Push Pull amplifier rig built in a decidedly 50s style. Many of us were able to recapture the feeling of the era, if only for a night or two. For me, it was a great time to be a kid.

Mothers still waited patiently for neighbors to finish their chats on party lines and when you called a business, you actually got a real person who would help you with your problem. There were real radio stores with their walls of tubes and salesmen who were fountains of knowledge, graciously and patiently given.

As a preview to the era that we now live in, television programs began to speculate about the coming of space travel. Science fiction movies reinforced the idea that we were on the threshold of an exciting new future. Occasionally at the theater, before the feature movie would begin, a one-reel short would show a man in a white lab coat, extolling the virtues of a very large room full of cabinets with hundreds of flashing lights, which he called a electronic computing device.

We, of course paid no attention, because this “egghead’s” (that’s what these guys were called back then) computer would never affect us in any way. How the world turns...

EASTERN ZONE			
STATION	POINTS	TX	RX
W1DDW	21	BC459A	Mod
K1FI	180	1946 Collins 32V	1946 Collins
W1FPZ	64	1929 Homebrew	1954 Collins
NV1X	6	1958 Johnson	1938 NC101X
KB2E	6	Mod	Mod
K2KK	25	1955 Johnson	1960 Hallicrafters
W2IFB	27	1948 Homebrew	1962 Heathkit
W2LID	24	Mod	Mod
KE2O	16	Mod	Mod
KB2PLW	0	1937 “Rollins HB”	1975 Realistic DX160
W2NI	54	1953 Collins 32V3	1955 Collins 75A4
W2ZM	390	1929 MOPA	1955 Collins 75A4
KB3SI	2	Mod	Mod
W3VVS	6	Mod	Mod
WA4IAM	168	1954 Millen 90801	1957 Collins 75A4
W2CQH/4	18	Mod	Mod
W4FRM	0	AWA Listening Post	1941 BC312
AA4RM	66	1953 Collins 32V3	1957 51J4
K8NI	4	Mod	Mod
AA9DH	18	Mod	Mod
N9TT	15	1955 Heathkit	1956 SX 101
N9OO	21	1956 Johnson	1940 National
N9VKY	216	1957 Johnson	1955 Collins
WESTERN ZONE			
K5RB	31	1939 6L6/809	National SW3

STATION	POINTS	TX	RX
K6TQ	162	1938 6L6/807 1936	National HRO
W7LNG	14	Mod	Mod
W8KGI/7	27	1955 DX-100	1949 National HRO
W7LOG	6	1944 VT-1	1938 Hammarlund
W7VS	0	1929 Hartley 1944	Hammarlund
KB0ROB	258	1936 Hartley	1959 Hallicrafters
DX ZONE			
SM4DIG	174	1959 Hallicrafters	1950 National NC2-40D

SILENT KEYS

We record the passing of the following AWA members with deep regret.

ARTHUR BAUER, OE3UA, (2-15-05) lived in Gerasdorf, Austria and was a leader in the first wireless museum in Vienna, Austria.

DESMOND G. HIGGS, who died earlier this year, lived in Sidney, BC, Canada.

REX MATLACK, W3CFC, 96, (3/24/2005)

Rex Matlack was a long-time radio amateur and ardent supporter of AWA. His interest in radio began during World War I when an uncle, who was on Major Edwin Armstrong's staff, gave Rex his radios for safekeeping while he served in France. The uncle died in the great influenza pandemic and Rex cared for the radios, eventually donating many of them to the AWA museum.

An early AWA member, Rex was a familiar figure at the our Annual Conferences and other AWA meets. He founded the Matlack Transmitter Award, a yearly prize given in conjunction with the Conference Old Equipment Contest.

He became a radio amateur in Vineland, NJ in the early 1920s, remaining active during most of his life. Rex eventually took a job with Philco, then moved on to CBS Radio. Highlights of his career there included having been master control at the

CBS Atlantic City Station WBAB on the day the Hindenberg exploded at Lakehurst, and also during the broadcast of Orson Well's War of the Worlds.

Rex died in St. Petersburg, Florida on March 24, 2005.

DONN R. NOTTAGE, W8JGP, 70 (5-2-05) worked for the General Electric Company, first in research and development, later advancing to a position in sales and marketing management. In 1983 he started his own business, Nottage & Associates, which specialized in the sales of high tech passive and active electronic components and systems. Nottage owned and operated W8JGP/R 442.300 MHz repeater which served a large region of Central New York State. He was active in many organizations including the American Radio Relay League, Inc., Quarter Century Wireless Association, Inc., Radio Club of America and the Skaneateles (NY) Rotary Club. Nottage was a past President of the Skaneateles Lions Club. (Thanks to Albert Burgin)

NORMAN J. PETERSON, N6DAC, 88, (5-27-03) lived in Santa Cruz, CA and worked for the General Electric Company for forty years.

Note: AWA officers and members are being asked to submit all information about Silent Keys to Pat Muehlbauer, P.O. Box 108, Stafford, NY 14143. This will help in the collection and coordination of information and appropriate recognition of both AWA members and others who have made contributions to the electronics and entertainment industries.

ABOUT THAT SECOND DIODE...

When the first duplex diode-triode tube appeared in the summer of 1931 (1), it was just what the Depression-starved radio market needed. In one low-cost package, the type 55 could simultaneously perform the roles of second detector, automatic volume control (AVC) tube and first audio amplifier, allowing radio manufacturers to gain significant savings in parts, labor and space over the three tubes formerly required for those functions. Within a few years almost every radio design incorporated one of the new duplex diode-triodes (e.g.: types 55, 75, 85, 2A6) or duplex diode-pentodes (e.g.: types 2B7, 6B7). The many future offspring of these early types continued in development and production until the end of large volume receiving tube manufacturing in the 1970s.

But, despite the success of these tubes, there is a question: why two diodes? After all, the vast majority of AM radio makers employed only one of the diodes in most of their set designs; the second diode plate was either connected to the first one, grounded, or left floating. Indeed, since just one diode can both recover the broadcast audio and provide AVC voltage for the radio, it would appear that no real need existed for a second diode in the first place.

Before we try to answer that question, let's take a brief look at a few of the circuits where this type of tube was used. Figure 1 is a familiar diagram of the second detector, AVC, and first audio stage of an AM radio receiver. The basic detector circuit includes the diode plates of V2 (connected together here, as was often done), the secondary winding of the i.f. transformer (IFT), and the diode load resistors R1 and R2 (which also have other functions to be discussed later). The circuit is completed by returning to the cathode of V2 through the common ground path.

The detector circuit is driven by the incoming amplitude-modulated i.f. signal. Referring to the waveform in Figure 2, the carrier frequency is represented by the fine vertical lines and the audio modulation by the outer wavy envelope. Audio can't be recovered directly from this waveform because the positive-going and negative-going mirror images of the modulation envelope cancel

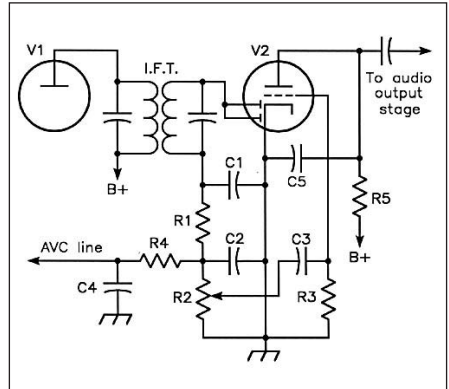


Fig. 1. A typical second detector/AVC/first audio stage.

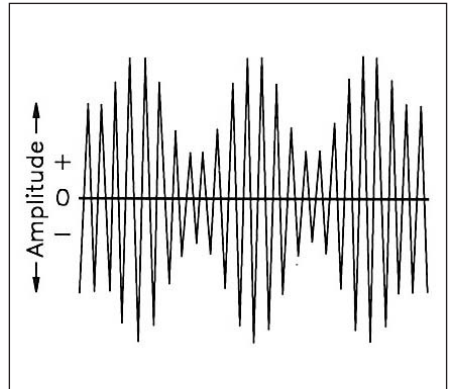


Fig. 2. An amplitude-modulated carrier waveform.

each other from instant to instant. A diode can be used to rectify the signal and eliminate half of the waveform, allowing the audio modulation to be recovered from the remaining half.

The key to understanding how this detector circuit works is to recognize that there is always a full cycle of i.f. signal across the IFT secondary. This means that when the waveform's polarity is positive at one end of the winding, it will be neg-

ative at the other end. During the half-cycle when the i.f. wave is swinging positive at the diode plates, the diodes switch “on” and close the circuit.

Since the polarity at the top end of R1 will be negative at this instant, the pulse of current flowing through R1 and R2 to reach V2’s cathode forces the voltage drop across these resistors to be negative with respect to ground. On the next half-cycle, the i.f. wave swings negative at the diode plates and the diodes switch “off,” opening the circuit and stopping the flow of current.

This process repeats continuously at the intermediate frequency with the amplitude of each half-wave pulse being determined by the modulation level at that instant. Since the peak pulse amplitude traces the modulation envelope, the recovered audio waveform lies along the peaks of the rectified i.f. carrier signal.

The carrier frequency pulses are the strongest component of the rectified signal and must be removed to prevent them from driving the first audio stage into severe distortion. C1, R1 and C2 form a low-pass filter which does this job. The filter integrates, or averages out, the rapidly-changing carrier frequency waves, smoothing them into a steady, negative DC voltage level. Meanwhile, the slower-changing audio frequency waves pass through the filter almost unaffected.

Thus, the filtered audio signal arrives at volume control R2 as a varying negative DC voltage (i.e., the audio waveform is superimposed upon the negative DC voltage level). C3 prevents the DC voltage from biasing V2’s grid into plate current cutoff and also restores the zero reference level of the audio waveform, which now resembles the audio signal originating at the broadcast station. A small DC offset is again introduced due to the “contact potential” bias (about -1V) developed across grid resistor R3.

The automatic volume control (AVC) circuit feeds off the detector circuit at the top end of R2. A portion of the DC and audio frequency components present at that point are passed through another low-pass filter consisting of R4 and C4. This filter has such a long time constant (at least .1 second) that it completely eliminates the audio frequencies coming through R4; only the negative DC voltage (which is proportional to the strength of the received carrier) remains across C4 to bias the RF, converter, and i.f. signal grids for AVC purposes.

R5 is the plate load resistor for the first audio stage, and C5 (when present) removes any i.f. signal which may have been coupled internally between the diode plates and the audio amplifier plate of V2.

Issues with the circuit of Figure 1

The circuit we’ve just overviewed can have several performance issues. Perhaps the most serious problem is the potential to encounter severe distortion on highly modulated signals, especially when the volume control is turned up. This is caused by AC shunting, which is nothing more than unequal loading of the AC and DC components of the detected signal.

The detector load for the DC component of the rectified signal is simply the sum of R1 plus R2, but the AC load consists of (roughly) R1, plus R2 in parallel with R3, R4, and the grid input resistance of V2, making the diode load resistance for AC much smaller than the DC load. The problem is compounded further when a tuning eye tube is connected into the circuit. The heavy AC loading badly distorts the audio waveform resulting in poor audio quality, especially for the higher audio frequencies.

Another issue with this circuit arises from DC flowing through volume control R2. Even though the current is only a few microamperes, in time it can cause the volume control to become scratchy. Some manufacturers tried to get around this by making R2 a fixed resistor and connecting C3 to the junction of R1 and R2, with the volume control taking the place of R3. This arrangement has its own problems, however, including even worse AC shunting effects.

The circuit of Figure 1 also suffers from poor weak-signal sensitivity brought about by premature AVC action due to detected electrical and atmospheric noise and adjacent-channel carriers charging C4 to rather high voltage levels when a distant station is tuned in. The build-up in AVC voltage reduces the signal gain of the receiver far more than is appropriate for weak-signal reception, resulting in poor signal-to-noise ratio.

Manufacturers loved this circuit because it was cheap (very cheap) to produce. Most consumers didn’t seem to notice its shortcomings and the radios were affordable enough.

About that Second Diode...

So far we haven’t seen any apparent need for the second diode which is present in this series of tube types, nor should we expect that just by adding one we can resolve all of the issues raised above. However, a second diode can help in some cases, so here are a few of the ways it was put to work:

Improving Second Detector Performance. In some types of duplex-diode tubes, a bit of the i.f. signal can be internally coupled from a diode plate to the grid and/or plate of the audio amplifier section. Signal detection may then occur in

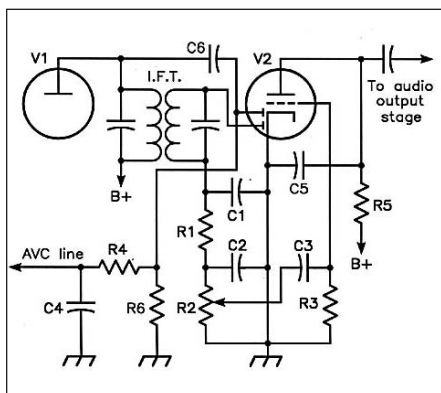


Fig. 3. Separate audio and AVC detectors.

the amplifier stage resulting in a condition called “play-through” (residual audio that isn’t affected by the volume control). Play-through could often be reduced or entirely prevented by either grounding one of the diode plates or leaving one of them unconnected to act as a kind of shield against the unwanted coupling.

It seems the most common way the two diodes were used was to connect them in parallel, as in Figure 1. Possibly this was done to improve detector performance on highly-modulated program material. The idea here is to keep the diode input impedance as low as possible in relation to the signal source impedance, thereby improving demodulation and reducing the possibility of distortion-producing peak clipping (2).

Full-Wave Detection. A few manufacturers used V2’s second diode in a full-wave detector circuit. This is similar to the half-wave circuit of Figure 1, except each end of the i.f. transformer secondary is connected to a diode plate and the diode load resistance is connected at a center tap on the winding. The full-wave hookup offered little in the way of practical benefit to the consumer and in fact twice as many turns are required in the tapped IFT secondary winding in order to get the same output voltage as the common half-wave detector, so costs were higher. Pressure to hold down costs curtailed this application of the second diode.

Gas Gate. What in the world is a gas gate? I wondered about this myself, until Ken Owens’ recent report of a blocking 6BE6 converter tube in a 1948 Spartan AM/FM set (3). The problem manifests itself by the sudden appearance of a high positive voltage on the AM converter signal grid, driving the tube into heavy conduction and blocking normal operation; changing the tube and even the socket didn’t help.

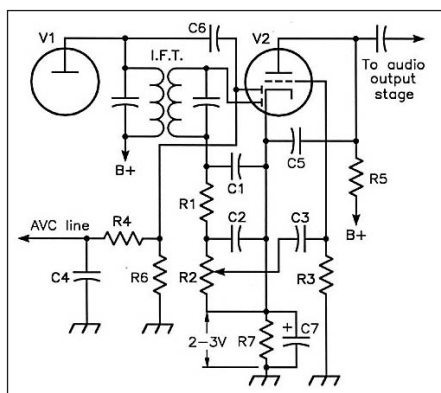


Fig. 4. A delayed AVC circuit.

In the malfunctioning set, incoming RF is fed to the converter signal grid through a small capacitor. AVC voltage is also fed to that grid through a resistance of several megohms. This hookup is reported to be prone to the blocking condition Ken reported.

According to Henney (4), “extensive use” was once made of a gas gate in this situation to bypass to ground any positive potential which appeared on the converter signal grid. Evidently, multigrid converter tubes tend to have higher gas content than most other types, and positively-charged gas ions are attracted to the negatively-charged signal grid, producing reverse grid current.

In effect, the negative AVC bias on the grid is overwhelmed by positive ionic charges to the point where a net positive potential of 30 to 40 volts or more appears across the AVC resistor. This drives the converter into heavy conduction (which makes the problem worse) and blocks its normal operation.

A gas gate can be implemented in the circuit of Figure 1 by simply connecting one of the diode plates to the junction of R4 and C4. The converter grid is also tied to this junction through an isolating resistance of at least 100k ohms. Now, when the signal grid starts to take on a positive charge due to the action of gas ions and/or grid emission, the gas gate diode will conduct and bleed off the positive charges before the runaway condition can develop. Sounds weird, but if you encounter this problem the gas gate hookup is one potential solution to it.

Separating the AVC and Audio Detectors. Figure 3 shows a circuit where one diode is used for audio detection in the way previously explained, but the AVC circuit has its own diode driven from the primary of the IFT through a small capacitor (C6, usually 50 to 100pF). R6

provides the load for the AVC diode.

This circuit significantly reduces the AC shunting effect present in the single diode circuit, although it doesn't entirely eliminate it. The smoother AVC action with this circuit pleased consumers, but it can be more difficult to tune in a weak signal that is adjacent to a strong signal. I.f. selectivity is reduced somewhat because of the additional load on the IFT primary. It has the advantage of providing more AVC voltage than the simple AVC circuit.

A common variation of this circuit omits the connection to the IFT primary and simply places C6 directly between the diode plates; however, the reduction in AC shunting isn't as good as with the arrangement above.

Delayed AVC. The circuit of Figure 3 suffers from the same AVC voltage build-up during weak-signal reception as the circuit of Figure 1—perhaps even more so. This can be countered with two circuit variations, one of which is shown in Figure 4.

R7 raises the cathode of V2 above ground by two or three volts¹; C7 bypasses R7. Because R2 and the rest of the audio detector circuit remain connected to the cathode, they are also raised above ground by the same potential and there is no difference in the way they perform from the earlier circuits.

But, since the AVC diode load is returned to ground, this diode sees the cathode at a positive potential with respect to its plate so conduction is delayed until the incoming positive signal peaks exceed that potential. This delay in AVC diode conduction prevents overzealous AVC action on weak signals and thus the receiver's signal-to-noise ratio is improved.

The circuit of Figure 4 applies no bias to the controlled tubes until the delay voltage is overcome, so some other means of maintaining a minimum operating bias on those tubes is usually necessary. One approach was to leave the cathode of V2 at ground and connect the lower end of AVC diode load resistor R6 to a "back bias" supply of -2 or -3 volts (taken across a small resistance in the set's B- return).

Because the AVC voltage cannot fall below this level, adequate operating bias is maintained on all of the controlled tubes. The signal-to-noise ratio is good because the small standing bias doesn't reduce signal gain very much. Since the AVC diode plate is again biased negative with respect to the cathode, this circuit also delays the onset of AVC action until the incoming positive signal peaks exceed the bias level.

Delayed AVC was usually limited to sets where good weak-signal performance was important. Communications receivers and better multi-

band sets often had delayed AVC circuits, some with additional AVC amplification as well.

"Quiet" AVC. One of the less-common uses for a duplex diode tube involved an inter-station muting circuit (5), or squelch. This cuts off the audio when tuning between stations so noise and static aren't heard.

Applications that do not fit. There are several applications requiring two diodes in which at least one diode must have a cathode that is separate from the other tube functions. FM discriminators and ratio detectors, most noise limiter circuits, and some "compensated AVC" circuits do not suit the tube types discussed here because both diodes share a cathode with the amplifier section. Several post-war duplex (or even triple) diode-triode/pentode types, intended for AM/FM radios and television applications, included one or more diodes with independent cathodes to accommodate applications such as these.

Summary

We've looked at several ways in which the second diode in a duplex-diode triode/pentode tube can be used to improve receiver performance. Whether the early tube manufacturers actually had all of these possible applications in mind is unknown to me. However, by including a second diode which could be used for full-wave detection or for separating the AVC and audio detectors, the tube manufacturers provided their customers not only a way to immediately cut costs with the new multi-purpose tubes, but also gave those customers the option to enhance their future products to promote sales growth.

The brutal economic environment of the Depression probably spoiled some plans for the second diode, with many radio manufacturers struggling to eliminate every possible cent of cost just to defer bankruptcy for a few more months. But, even when the consumer economy took off again after World War II, the second diode didn't see widespread application across the AM broadcast receiver market.

Achieving the most profit at the least cost is, and always has been, the mantra of American business. We may sometimes wish otherwise, but it is hard to argue against that philosophy. 📌

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(continued on page 64)

AMATEUR RADIO IN THE 1950S: ROMANCE AND REALITY

In the 1950s, amateur radio or “ham radio” seemed almost magical. There was no Internet, long distance telephone calls were expensive, and international air travel was limited. People knew that Hams talked to each other all over the world, which was perceived as glamorous and exciting. They also knew that Hams often provided emergency communications during disasters and had played an important role in military communications during World War II.

Most people were pleased to have a ham radio operator in their neighborhood. They were often even quite willing to allow a ham to run a long wire antenna across their backyard.

During that era, many home radios covered shortwave bands, which enabled people to listen to hams talking to each other. Some listeners decided to become hams themselves so that they could participate in this exciting hobby. Their first step would be to begin studying for a license.

Licensing

In the 1950s, the Federal Communications Commission (FCC) ruled supreme over the airwaves. The agency totally controlled radio broadcasting, commercial radio communications and, of course, amateur radio. Obtaining a ham radio license required passing Morse code receiving and sending tests and a stringent written exam.

Every aspiring radio amateur quickly acquired a copy of the American Radio League (ARRL) publications related to licensing. These included



1951 edition of the ARRL's Learning the Radiotelegraph Code.

How to Become a Radio Amateur, The Radio Amateur's License Manual, and Learning the Radiotelegraph Code. The prospective applicant worked with these self-study aids and practiced Morse code until he or she felt ready to take the exam at an FCC office.

Larger cities, like Buffalo, Detroit, Boston and New York had FCC offices where amateur exams were given on a regular basis. In addition, FCC personnel gave examinations in other cities, like Cleveland and Pittsburgh, on a quarterly basis. Sitting for the examination often involved time away from work or school, and it sometimes required a long drive to an FCC examination location.

By about the mid 1950s, the General class amateur radio license conferred operating privileges on many modes and bands. Higher license classes (Advanced or Extra), were required for voice privileges on some of the more crowded band segments. Later in the decade, General licensees were given full operating privileges. The license was issued for five years and was renewable.

Passing the exam for a General class license was not easy. First, the applicant took a 13 word-per-minute Morse code receiving test. If that test was passed, a 13-wpm sending test followed. The applicant was allowed to take the written test only after he or she passed the sending and receiving tests.

The prospective ham who had passed the written test waited until the mail brought the coveted license. Anyone who failed any portion of the examination had to wait 30 days before trying

Heathkit FM & TELEVISION SWEEP GENERATOR KIT

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- For boys or adults. Has been constructed successfully by 1 year old boys.
- So excellent was the team that the circuit plan for adult program. Boys will enjoy this for years and obtain knowledge using their kit. Every part supplied—gray enamel cabinet, 3 tubes, complete detailed instructions for assembly and use. Shipping weight 11 lbs.
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- Every 58R1 and 58R2, 5 tubes and 12" high 3" deep. Beautiful 2 color panel.
- Under any circumstances an expert of visual electronics. An oscilloscope provides linked oscilloscope of an expert in radio, electronics, and scientific research. Order on new scale with 1000 ohm load. Includes detailed instructions and photographic layout. Diagrams make assembly easy. Shipping Weight 35 lbs. Express only.

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- Under any circumstances an expert of visual electronics. An oscilloscope provides linked oscilloscope of an expert in radio, electronics, and scientific research. Order on new scale with 1000 ohm load. Includes detailed instructions and photographic layout. Diagrams make assembly easy. Shipping Weight 35 lbs. Express only.

Early Heath Company kits featured simple electronics and test gear, including their famous oscilloscope. Ham equipment soon followed.

made it possible even for beginners to successfully assemble a Heathkit.

The Heathkit DX-100 transmitter was extremely popular in the 1950s. It had an input power of 120 watts on CW and 100 watts on AM phone and had a built-in VFO. It sold for \$190 in kit form. Heathkits were often less expensive than other kits, because Heath frequently used new, military surplus parts and bought many other components in large quantities at discount prices.

All of the equipment in that era used vacuum tubes, and the glow from those tubes was a sight never to be forgotten. Unfortunately, the equipment was large and heavy. A Heathkit DX-100 transmitter weighed 107 pounds and a National HRO-50 receiver weighed 84 pounds. Today, such a radio is often referred to (sometimes fondly, sometimes sarcastically) as a "boat anchor."

The final ingredient for getting on the air was the installation of an antenna. Wire antennas were widely used on all of the shortwave Ham bands. Also, some hams used beam antennas on the higher frequency ham bands.

On the Air at Last!

Every ham remembers his or her first on the air contact. It truly seemed like a magical moment to talk to someone via radio. The conversations included station equipment, occupations, the weather, and other non-controversial topics. In that era, hams did not talk about religion, politics, or anything that might be the least bit offensive. Nevertheless, the conversations were enjoyable.

NEW HALLICRAFTERS Model S-38



★ 540 KC to 32.4 MC Continuous Coverage
★ Electrical Band-Spread
★ Built-in PM Dynamic Speaker

This new Hallicrafters Model S-38 is the finest receiver value ever offered in the low price field. The unusually fine styling makes this an ideal receiver for use in any room in the home. In addition its super-sensitivity makes it an excellent receiver for communications service. Four bands are covered: 540 to 1,680 KC; 1,680 to 5,200 KC; 4,750 to 15,000 KC and 13,000 to 32,400 KC. The main dial is calibrated in megacycles. All controls are clearly marked and include the following: Noise Limiter, Band Switch, BFO, BFO Pitch, Speaker/Phone Switch and Standby Switch. Headphone jacks and antenna terminals are provided at the rear of the cabinet. Steel cabinet is finished in satin gray, and the speaker grill in the cabinet top is of anodized steel. 1.5 watts of audio output is available which is more than ample for all receiver requirements. Electrical bandspread dial permits operation of stations for communication or station logging purposes. Tubes required: 12SA7 Converter, 12SK7 IF Amplifier, 12SQ7 BFO-Automatic Noise Limiter, 12SQ7 2nd Detector-ABC, 1st Audio Amplifier, 50L6GT 2nd Audio Amplifier and a 50Z5GT rectifier. Operates on 105-120 volts, 40-60 cycles AC or 105-120 volts DC. May be used on 250-250 volts AC or DC with the 250 volt line cord converter listed below. Receiver includes built-in PM dynamic speaker. Overall size: 12 1/4" wide, 7 1/4" high, 8 1/2" deep. Wt. 14 lbs.

C2182—Model S-38 Receiver, with tubes. **\$47.50**
C5245—250 Volt Line Cord Converter. **Your Cost . . . \$1.41**

HALLICRAFTERS Model S-40A



The first of Hallicrafters post-war communications receivers is this sensational new model with the finest performance ever presented in the popular price field. A completely new conception of receiver beauty and styling is incorporated in this receiver. The top of the cabinet itself provides the maximum in ventilation by use of a multitude of fine openings. Controls are clearly identified and the normal positions are marked in red for standard broadcast reception. Features never before available in a receiver in this price class are included. Of particular note is the use of the RIF section consisting of permeability adjusted "micro-air" inductances identical with those in the most expensive Hallicrafters receivers. Excellent signal-to-noise ratio and high sensitivity are assured by the use of a 6SA7 pentagrid converter. Many other outstanding features are: automatic noise limiter, temperature compensated IF oscillator, beat frequency oscillator, separate RF and AF gain controls, three position tone control, separate electrical bandspread with inertia flywheel tuning dial, frequency range from 550 to 44,000 kilocycles are covered in four bands: 550 to 1,780 KC; 1,780 to 5,400 KC; 5,400 to 15,800 KC; and 15,800 to 44,000 KC. Wide vision main tuning dial is accurately calibrated in megacycles. Pitch of BFO can be adjusted from the front panel. Special socket for external power supply. 2 1/2 watts maximum audio output. Socket provided for connection of external Model "SM-40A" "S" meter. Nine tubes: 6DS7 RF amp.; 6SA7 converter; 6SK7 1st AF; 6SK7 2nd AF; 6SQ7 2nd detector and 1st audio amp.; 6V6G 2nd audio amp.; 6BE6 AVC and noise limiter; 6J5GT BFO. 90 rectifier. 60 cycle AC. 18 1/2" x 8 1/2" x 11 1/2".

C2184—S-40A For operation on 110V/50/60C A.C. **\$89.50**
C2185—S-40A? Universal Model for use on 110/220 volts, 25 to 60 cycle AC. **\$98.50**
C2186—SM-40 (External "S" meter). **Your Cost . . . \$8.50**

The S-38 (left) and S-40, low-end receivers of the Hallicrafters line, were popular entry-level sets for new amateurs.

As the QSL cards confirming contacts began to accumulate, they were proudly displayed for the admiration of friends, visitors, and neighbors. It was hard for someone to not be impressed when seeing the colorful cards from far-away places.

End of an Era

As the 1950s progressed, amateur radio began to change significantly. For example, vacuum tubes were replaced by transistors; AM phone was replaced by single sideband; separate transmitters and receivers became transceivers; and Hallicrafters, National, and Heath disappeared. Society changed also, and the ham radio operator no longer seemed to be a glamorous figure.

However, hams have always changed with the times. By the 1960s and 1970s, they accepted SSB, began using repeaters on the VHF Ham bands, and learned how to integrate computers into amateur radio. Nevertheless, those who first experienced ham radio in the 1950s will always remember the magic and romance of that era. ☐

SECOND DIODE, continued from page 61

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FOOTNOTE

¹In the circuit of Figure 4, V2 must be able to operate satisfactorily with bias in the -2 to -3 volt range; the back-biased diode method can be used with other tubes.

RE-CREATING REGINALD FESSENDEN'S LIQUID BARRETTTER

Part 2 — Performance Evaluation

(Part 1, "Building a Replica," appeared in the April AWA Journal)

To evaluate the performance of my revised acid cup detector, I compared it to the results obtained with a 1N34A crystal detector at various frequencies. Using an RF signal generator (U.S. Navy model AN/URM-25H) I supplied 500 kHz (600 meters) to 1,000 kHz (300 meters) to the crystal set in increments of 100 kHz modulated 50% at 1 kHz (see Figure 8). These wavelengths were in common ship-to-shore use around 1905. Output was measured with a Hewlett-Packard model 403B dB meter. I tested my detector against the crystal set's internal 1N34A several times at the various wavelengths and the best performance is shown in the Figure. Tests were also conducted at modulation frequencies from 400 Hz to 1,200 Hz with each detector, but varying the audio frequency over this range had no effect.

The pattern of output values for the 1N34A across frequencies was reasonably flat, except for a drop at 550 kHz seen also with the electrolytic detector. This was likely a flaw in the tuning characteristics of the set. Apart from this, the electrolytic detector and the 1N34A performed equally well at 500 kHz. The output of the electrolytic detector fell to about 7 dB below that of the 1N34A at 750 kHz and to about 14 dB below at 1,000 kHz.

I ran another test, comparing the output of the

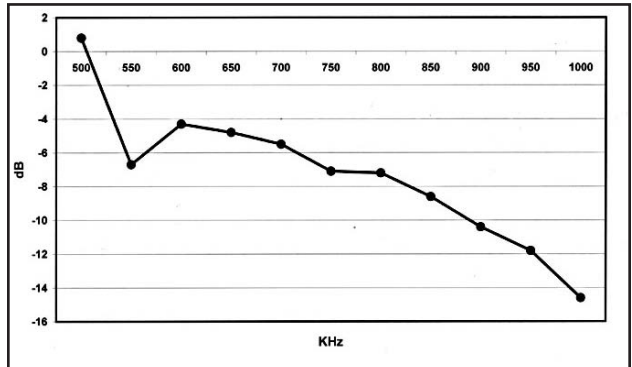


Fig. 8. Output of carbon-cup electrolytic detector minus output of 1N34A in the Skywaves receiver at various frequencies modulated at 50% with 1 kHz signal.

DETECTOR

1N34A (reference)
perikon #1, unknown manufacture (Figure 9)
carborundum, unknown manufacture, no bias (Figure 10)
galena Westinghouse type DB replica (Figure 11)
electrolytic, no bias, (Figure 7)
perikon #2 Westinghouse type DB replica (Figure 11)

OUTPUT

0 dB
-1.9 dB
-5.2 dB
-5.4 dB
-5.6 dB
-10.8 dB

1N34A against external galena, perikon (2), carborundum detectors, as well as my electrolytic detector at 750 kHz modulated 50% at 1 kHz. The results are shown above.

Note that the output with the electrolytic detector at 750 kHz is shown as -7.1 dB in Figure 8 and as -5.6 dB in the table above. Differences of this magnitude were often seen when separate series of measurements were compared. They are

due to the many variables connected with the experimental setup, including, perhaps, or else my lack of skill in operating the detector.

Both carborundum and electrolytic detectors are sometimes used with a small bias voltage across them. In such an arrangement, 3 or 4 volts DC is supplied through a 500 ohm potentiometer, and the adjustment is said to be critical. However, I was unable to demonstrate any im-

provement with bias applied to either detector.

I did notice a transient increase probably due to insertion noise. The output then returned to its earlier value. It occurred to me that without a sensitive output meter, it might be difficult to distinguish these events from an improvement in output.

Conclusions

After some trial and error, I was able to demonstrate a satisfactory electrolytic detector. The addition of a DC bias did not improve its performance. In 1903, Fessenden argued that the action of his detector was thermoelectric rather than electrolytic. However, he would not have had instruments necessary to indicate a heating effect, and more recent authors do not mention heating as part of the rectification phenomenon in liquids. Nonetheless Fessenden's liquid barretter worked, and he was awarded a number of patents for it. I suspect that the device was simply a variation of the electrolytic detector, several of which were invented around the same time. Fessenden's instrument was priced at \$2,500 and the U.S. Navy refused to buy them from him.⁶ Under these circumstances I'd have recommended the \$1.25 E.I. Co. version. Aitken² observed that the Secretary of the Navy had stated that Fessenden was asking too high a price and therefore the department "feels that it is relieved of any moral obligation that might otherwise exist." (p. 57).

In early books the electrolytic detector is described as superior to any mineral detector. (The Perikon detector was not available at the time of the statement.) In my tests, the carborundum, galena and electrolytic detectors are essentially indistinguishable in performance. Perikon detectors worked both better and worse than these.

My rankings are difficult to compare to those conducted in 1915 and reported by Phillips in 1980.⁷ Part of the reason for the difficulty is that in the era of spark transmission, a unique set of factors enters the comparison. (Both the liquid barretter and electrolytic detector were in use from the era of spark to the time of continuous wave transmission. Fessenden, through NESCO, had provided liquid barretters to United Fruit Company ships. Those ships in the Caribbean heard his first ever voice transmission in December of 1906. Subsequent detectors were developed with continuous waves in mind.

Acknowledgements

I thank Don Trueman for the loan of the test equipment and for his technical advice. Welcome suggestions were made by Larry Babcock,

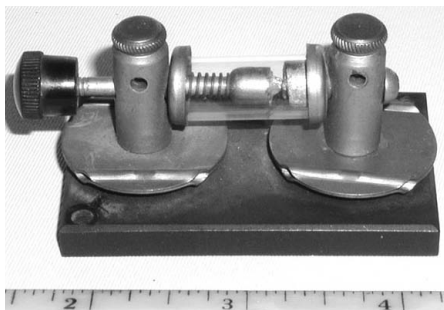


Fig. 9. Perikon detector of unknown manufacture.

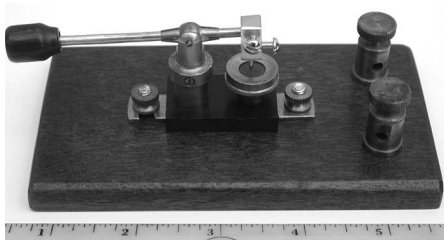


Fig. 10. Carborundum detector of unknown manufacture, with replica lever.

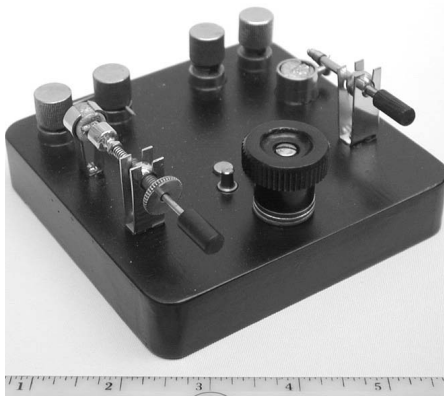
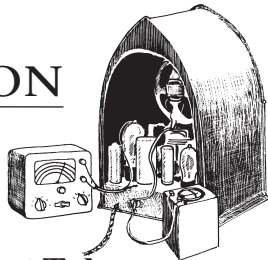


Fig. 11. Westinghouse type DB replica.

EQUIPMENT RESTORATION

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INCLUDING SASE FOR REPLY.



Pinout Variation Disables Output Tube

John Kaetz, Jr. (Bessemer, AL) send this interesting experience with off-brand tubes.

John was repairing the stereo amplifier from a 1962 ROCK-OLA 1493 jukebox. Having only the amplifier and power distribution panel, he had to provide a volume control to replace the outboard one as well as a set of speakers. All tubes checked good except for one 6973 which was marginal.

After repairs were made, power and signal were applied and there was some output from one channel. There was about 60 V of drive on the 6973 grids and all DC voltages were present, though somewhat high. The output transformers were good.

John then swapped the paired 6973s to the opposite channels and the sound followed. At this point, John noticed that only the marginal 6973 was hot; the other three were only warm, apparently not drawing current.

Reference to the tube manual showed that the 6973 has dual pinouts for G1 (3 & 6) and G2 (1 & 8). The screen connection was wired only to socket pin 8 in the amplifier.

Careful inspection of the tubes showed that only the marginal tube had dual pinout. The other 3 tubes, branded "PRO/COM" had the screen connected only to pin 1. There was no connection to pin 8. Thus the combination of socket wiring and tube construction resulted in no screen voltage on 3 of the output tubes. Connecting jumpers between pins 1 & 8 on the tube sockets solved the problem.

Elsewhere in the tube manual, it is stated that "Double base pin connections for both grid no. 1 and grid no. 2 provides cool operation of grids and permits the use of high values of grid circuit resistance to reduce driving power."

John believes that excessive grid temperature is the major factor causing the control grid to go positive in miniature power tubes such as the 50B5 after about 30 minutes operation. The result is distortion and high tube current. It also occurs frequently in TV sets which use 6CB6s and other high G_m tubes. Philco had this problem in the 1950s in sets using three to four 6CB6s with very high common grid circuit resistance. The result was overload wash-out and intercarrier buzz. ☐

Brian Belanger, Bill Holley, Norm Hertz, Bart Lee, Robert MacIntyre, Peter Yanczer and others at the 2004 AWA Conference. ☐

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Old-time ads are free to members collecting and restoring equipment for personal use. *The AWA Journal* classified ads are also available for browsing in the "AWA Journal On Line Edition" on our Internet Web site (www.antiquewireless.org). Please observe the following: (1) include as SASE if acknowledgement is desired; (2) material must be more than 25 years old and related to electronic communications; (3) give your full name, address and zip code; (4) repeats require another notice (we are not organized to repeat automatically); (5) the AWA is not responsible for any transaction; (6) we retain the right to reduce an ad's size if over seven lines; (7) AWA does not accept commercial advertising in this column; and (8) closing date is six weeks prior to first day of month of issue. Ads received after that time will be held for the following issue. Mail all ads to: RICHARD RANSLEY, P.O. BOX 41, SODUS, NY 14551 or email to richardransley@mac.com.

In order to give members wider distribution for their ads, our classified section has been made available for all to read on the AWA Web site (www.antiquewireless.org). And in order to increase the number and variety of the ads in the section, we also now offer free postings to non members. But with this more public exposure of our classified section inevitably comes some increased danger of contact with dishonest buyers and sellers. Be careful!

In a very common fraud, a prospective buyer will offer to send the seller a check for a generous amount of money and to arrange for packing and shipping the item. The seller is to pay the packer/shipper, deduct his own fee, and return the balance of the money to the buyer. Don't allow your item to leave your hands until you are certain the check will clear!

SELL/TRADE—BC-SW TUBE RADIOS

Battery radios: RCA Radiola, beautiful original shape w/tubes, \$160.; Freed-Eisemann FE-15, \$125.; Crosley XJ, \$125.; A-K 35, \$60., all in excellent condition. Tubes available at extra cost; Trav-ler portable w/CX/UX199 tubes, accessory kit & instructions, in display condition with a little cleaning, \$100. Also have several horn loudspeakers. Nick Tonkin, 1206 W. 47 Ave., Anchorage, AK 99503 (907) 563-4553 E-mail: akradioman@att.net

A-K-20 big box, no tubes, good shape, \$120.; A-K-33, six tube set with two volt tubes, good shape, \$75.; same as previous, but no tubes and in fair condition, \$40.; Aeriola Sr., wood panel nice, with tube, \$150.; Radiola III with two WD-11 tubes, \$200.; Beaver Baby Grand crystal set, collector item, \$200.; Philmore crystal set, \$25.; no name factory built crystal set, \$30. Paul Thompson, 340 Old Mill Road Spc 247, Santa Barbara, CA 93110 (805) 692-1941 E-mail: atkent9@cox.net

SELL/TRADE—COMMUNICATIONS GEAR

Hallicrafters SX-99 rebuilt and looks good, \$100.; Hammarlund HQ-160, rebuilt, \$100. Both plus shipping. Both have manuals. Lou Rydant, W1LNG, 53 Crestwood, Northboro, MA 01532 (508) 393-8362

National HFS radio for sale with manuals, schematic and 5886 Power Supply, in very good condition. \$145 plus shipping. Vladimir Kruzick, 461 Erindale Cr., Thunder Bay, Ontario, Canada P7C 4Z7 (807) 577-1551 E-mail: vkruzick@tbaytel.net

SELL/TRADE—GENERAL

WWII German "morale" radio. Nice condition. Also Mechanical Television Receiver Echophone Model 41. Uses "crater" lamp to project image through lens disc. Will have both sets at the August Conference. Richard Brewster. 145 Little Peconic Bay Road, Cutchogue, NY 11935 (631) 734-5063 E-mail: brewster@mercyships.org

An early thirties Atwater Kent salesman demo record (78) used to describe the features of the AK Model 75 (70 series, P-chassis). The recording features the famous announcer Graham McNamee discussing the set which featured a radio and record player combination. Michael DeGroat, 7 Church Road, Hatfield, PA 19440 Tel. (215) 996-5656 Fax (888) 883-9380 E-mail: michaeld@libertyfg.com

Vacuum tube consoles and equipment for sale. Repaired, tubed and working, including: Sylvania Storage Display Unit, Tektronix Transistor Curve Tracer, Zenith AM/FM Stereo record player

Model RM2420, Emerson AM radio and record player Model 634, RCA Victor Magic Brain Radio Model 9K2, Philco console Model J9-45, GE AM Model J105 and Airline AM battery receiver series 092. Prices negotiable. Delivery in the Binghamton, NY area. Stephen Demarco, 2 Crestmont Rd., Binghamton, NY 13905-4116 (607) 797-7991

Thirty-one telegraph items, selling individually and includes sounders, relays, test equipment and keys. Request free photo CD. Bob Puttre, 637 Stratford Road, Baldwin, NY 11510 (516) 223-9667 E-mail: puttre925@usadatanet@net

Old radios and unusual items, manuals, magazines, books, service sheets and more. Lifetime collection of silent key Richard Birkett, 42 Halvarras Rd., Playing Place, Truro, TR3 6HD Cornwall, United Kingdom E-mail: richard@rab-eng.wanadoo.co.uk

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For trade or swap: large selection of original manuals for EICO, B&K, Superior, Hickok, RCA, HP, Accurate, Collins, Conar, Heathkit, Hallicrafters, Hammarlund, National, Globe/WRL, Zenith, Allied, Multi-Elmac, Knight Kit, Johnson, Gonset, B&W, RME, Harvey-Wells, Morrow, Lafayette, Mosley, Drake, Regency, Ameco, Clegg, Pierson, Davco, Realistic/Archer, Subraco, Simpson, Triplett, Howard, Millen, EchoPhone, McMurdo Silver, Paco, Central Electronics, Eldico, Boonton, Dynascan. A.J. Bernard, P.O. Box 690098, Orlando, FL 32869-0098 (407) 351-5536 E-mail: ni4Q@juno.com

RCA Television Service Data for RCA Victor Models 630TS, 648PTK, \$12.50 plus shipping. John Uscinowski, KE2O, 95 Vly Summit Rd., Greenwich, NY 12834-7700

Modern Radio Servicing, Ghiradi, 2nd ed., \$30.; *Drake's Radio Encyclopedia*, 1928 ed., \$25.; Nick Tonkin, 1206 W. 47 Ave., Anchorage, AK 99503 (907) 563-4553 E-mail: akradioman@att.net

Radio Broadcast magazine, May 1922 to April 1930 in bound volumes complete, \$350. Paul Thompson, 340 Old Mill Rd. Spc 247, Santa Barbara, CA 93110 (805) 692-1941 E-mail: atkent9@cox.net

Grebe documents and photographs—last offering of these items. Net proceeds will be contributed to the Grebe Memorial Fund at The Radio Club Of America. A comprehensive list of items is available. Send inquiries, stating your

mailing address or E-mail address to: Alfred H. Grebe, Jr., 1001 Westham Parkway, Richmond, VA 23229 (804) 285-3319 E-mail: radioman860whag@aol.com

Index to AWA publications. Lists 8000+ citations from all AWA sources, 1960 to mid-2004, including *OTB*, *Review*, and misc. pubs. Indexed by topic and author. Handy 5½" x 8½" format, 90 pages. \$12 postpaid anywhere. Ludwell Sibley, 102 McDonough Rd., Gold Hill, OR 97525, or via Paypal to: tubelore@jeffnet.org

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Hewlett Packard Vacuum Tube Voltmeters, HP400D, \$20.; HP410D, \$30. Shipping extra. Jack Freeman, 2512 Sunnycrest Dr., Reidsville, NC 27320 (336) 349-6656

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Grunow "Teledial Twelve" in restorable condition. I will pay a fair price and will pick up anywhere in New England. John Bachman, P.O. Box 1200, Amherst, NH 03031-1200 603.321.0884 E-mail: john@anatek.mv.com

Andrews Deresnadyne battery radio with horn in top. Shown in *Vintage Radio* by McMahon. Thanks. Ted Depto, 913 5th Ave., Patton, PA 16668

WANTED—GENERAL

Anyone who may be able to refurbish/rebuild/replace the Catacomb from a Super-Hetrodyne RCA Radiola 28 that is installed in a Victor Borgia I phonograph cabinet. Eric Davidson, 106 Pleasant Rise Drive, McDonald, PA 15057 (724) 693-9243 E-mail: fuzzy1313@comcast.net

Chassis and speaker for RCA R-5 "Radiolette." Joe Bentreovato, 84 E. Munson Ave., Dover, NJ 07801 (973) 361-7392 E-mail: jbentreovat@msn.com

WANTED—INFORMATION

Looking for info and an accurate schematic for a Pilot Super Wasp variant. The schematic appears in Vol. IIB of D.H. Moore's "Vintage Radio Identification Sketch Books." The circuit shown was developed by the staff of 3XP, the station of "Radio in the Home." I have tried to replicate this radio without success, and believe the drawing is incorrect. Also, no coil data is given. Any info would be appreciated. William Jelinke,

(continued on page 71)

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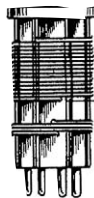
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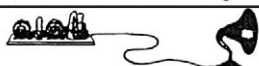


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0.0025	25K630V	0.047	47K630V	
0.0027	27K630V	0.05	50K630V	
0.003	30K630V	0.056	56K630V	
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CLASSIFIED ADS, continued from page 69

3985 Manor Loop, Rhinelander, WI 54501 (715) 362-2909 E-mail: jelin@charter.net

Seeking information on a Metrodyne, Single Dial radio manufactured by Metro Electric, Chicago, IL. That is all the information I can find on the set. It has a beautifully embossed front panel. Four tubes on the right are missing and, as a minimum, I need to know the types. Irv Sanders, 242 Hunter Lane, Harrisburg, PA 17112 (717) 469-2185 E-mail: irvsparkey@wmconnect.com

Riders Successful Servicing Monthly. Donald Swope, Box 41, Tremont, PA 17981

WANTED—PARTS

Audio transformer for Tuska 225 receiver. Transformer measures $2\frac{1}{2} \times 2\frac{1}{4} \times 3$ in. high and has a black rubber cover on either side of laminations. Covers are embossed with "CD Tuska Co." Would prefer a good one so receiver can be used in the OT Contest on 160, but a dead one would also serve. Bill Hurni, W3WHT, 329

Evergreen Dr., North Wales, PA 19454 Tel. (215) 699-5787 E-mail: wmhurni@att.net

Indoor FM antenna by B.I.C. made in the Sixties. Condition unimportant. Also FM whip antenna. Charles Graham, 4 Fieldwood Dr., Bedford Hills, NY 10507 (914) 666-4523

For a Splitdorf Abbey I need the nickel plated & printed tube cover plate. For a National SW-3 (Model 2) I need any of the following coil sets: 60A (160 Meter Bandspread); 72 (90-160 kHz); 71 (150-220 kHz); 70 (190-280 kHz); 69 (250-390 kHz); 68 (320-650 kHz); 67 (500-900 kHz); 66 (690-1500 kHz); 65 (1500-2700 kHz). Jim Forest, 28941 Hill and Dale Dr., Mechanicsville, MD 20659 (240) 538-3474 E-mail: jforest2002@juno.com

DeForest or CITCO enclosed crystal detector and plug-in coil for Canadian Independent crystal set. (Same as deForest Everyman). Tom Stevens, 37 7A St. N.E. Calgary, Alberta, Canada T2E-4E3 E-mail: tomnel@shaw.ca

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(3) "Broadcast Receiver Manufacture by General Electric and Westinghouse in the First Decade of RCA" by Robert Murray

Robert Murray has done extensive research on what occurred behind the scenes when GE and Westinghouse were producing RCA radios during the 1920s. RCA collectors and those interested in radio developments at GE and Westinghouse will find this article especially helpful.

(4) "Evolution of the Submarine Telegraph With an Extensive Bibliography" by Bill Holly

Bill Holly provides a detailed chronology documenting key developments in submarine cable technology, and has prepared what is probably the most extensive listing of books and articles about submarine cables ever published.

(5) "The Evolution of the National HRO and its Contribution to Winning World War II" by Barry Williams

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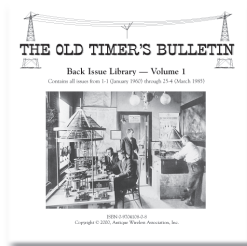
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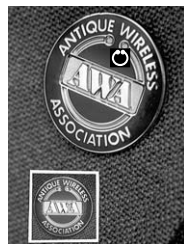
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